Manufacturing Operations on Jewelry Settings

American Machinist

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FRED H. COLVIN, *Editor*

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WHO'S WHO

MR. A. W. WIGGLESWORTH

THE late Mr. E. H. Harriman believed ardently in the "ultimate" prosperity of the United States at all times. So does Mr. A. W. Wigglesworth. Not flood, pestilence, panic, gloom-prophet or world war can even temporarily shadow the brightness of this belief.

After being born at Walworth, N. Y., December 21, 1872, and getting an M. E. degree from Cornell in 1893, Mr. Wigglesworth began work as a machinist on the C. B. and Q. R. R., at Havelock, Nebraska. Later he was chemist for the Utah Sugar Company and engineer at Eugenie Teresa, Manzanilla. In 1896 he became a machine-tool designer and salesman, in 1902 Chicago manager for Hill, Clarke & Company, and in 1905 director, treasurer and general manager. He is now president and managing director of both Hill, Clarke & Company, of Chicago, and the Chicago Machine Tool Company.

Mr. Wigglesworth is a member of the Chicago Athletic Club, Quilmette Country Club, North Shore Golf Club, Oriental Consistory-Evanston Commandery K. T. Medinah Temple-Shrine.

Mr. Wigglesworth has a few minor hobbies, such as developing the men who are under him, motoring, golf and tennis, but his major hobby is the remanufacture of second-hand tools. Next to his faith in the good old U. S. A. is his faith in American-made machine tools. He can outroot the best rooter the tool has, be he designer, manufacturer or salesman. "You don't know," says he, "*how* good your own tools are."

JUL 12 1918

By
J. V. Hunter

Manufacturing Operations On Jewelry Settings

MOST mechanics are not sufficiently familiar with the fine tool work of the finger-ring and scarf-pin kinds to realize that in their manufacture many of the methods used in other lines of machine work may also be adopted in this branch of production. Punch and die press operations are serviceable in this line even for producing the finest rings of a quality that might be termed hand made. Indeed the work to a great extent is made by hand, so far as the finishing operations are concerned, though in the early stages of manufacture operations formerly done by hand have been eliminated and a finer quality of work produced by substituting die-press operations.

To those who are accustomed to high-grade die making in the usually accepted sense of parts such as for typewriters, meters, etc., the dies used for the small, delicate parts of jewelry settings will be of unusual interest. Some of the methods may convey ideas to others who can adapt them to other lines of work.

One of the leaders who have specialized in the manufacture of the highest grade of finger rings, scarf pins and to some extent in special designs of brooches is the Jones & Woodland Co. of Newark, N. J., who has designed and built dies for embossing and piercing filigree and other jeweled pieces in a quite remarkable manner.

For a clear understanding of some of these manufacturing methods it is perhaps desirable that a few details of the ring section be included. Fig. 1 shows the different parts making up a filigree ring with jeweled settings in their relative positions as they are placed in building up such a ring. There are two main parts, or side pieces, both of which are pierced to surround the finger and are soldered together, they being shown at *A*. To receive a stone the parts must be spread apart at the top, as will be noticed, and to fill this space, where they separate, the piece *B*, a small triangular section of similar design, is placed one at each end of the stone in the position shown. These are soldered together on the lines where they join. The part *C* is stamped, cut and pierced to shape in the flat form, so that when bent into the shape indicated the top edge will come into a straight line. The final piece *D*, known as the bezel, is soldered on top of the piece *C* and holds in place the stone used in the setting. Each of these pieces is finished complete by machine and die-press methods. The hand work begins when they are being shaped to fit a setting and in the matching and soldering together of the individual parts. This hand work requires time, and from this point on each ring assumes almost an individuality of its own. Another type of ring called the signet is that shown in Fig. 2 and it is made up complete of one piece of metal. The two ends of a stamping are drawn out, shaped together and soldered at some point, as at *G* in the illustration. If it is wanted with a jeweled setting instead of a solid metal plate *F*, before the ring is shaped up a hole is pierced, as indicated by the dotted line, for the purpose of holding the jewel.

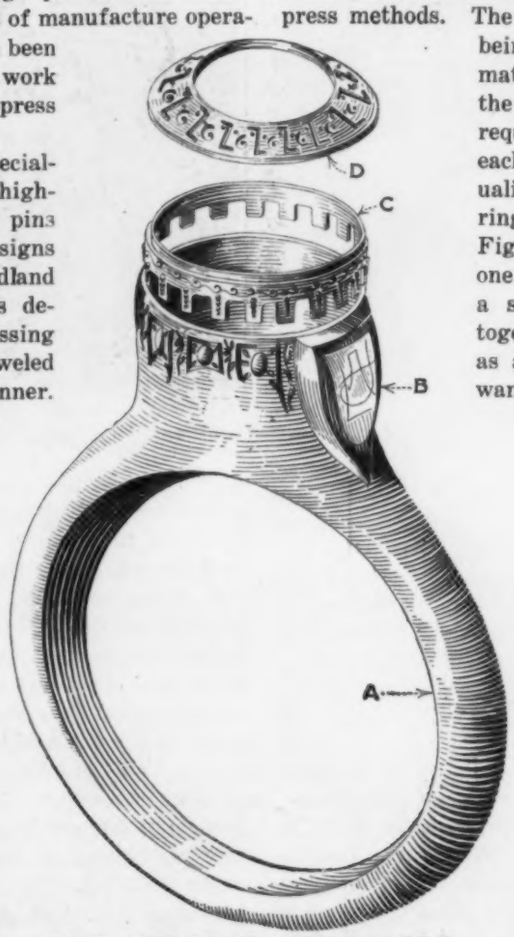


FIG. 1. DETAILS OF A JEWELED RING

Similar dies and methods are employed for building the other jeweled pieces, such as scarf pins, and the details of these parts are not illustrated because of their similarity.

The first operation is that of making the ring which surrounds the finger, or the main body piece of a finger ring. This is punched from sheet metal, gold or platinum, as may be specified, by the die *A*, Fig. 3, the punch being

shown at *B*, this furnishing the blank. The next operation is piercing the large hole for a ring to slip over one's finger. This is performed on the die *C*, which, it will be seen, is covered by a set plate of the exact thickness of the sheet metal to line the blank in exact position over the hole. A unique form of stripper plate *D* is pivoted at one corner of the die, being

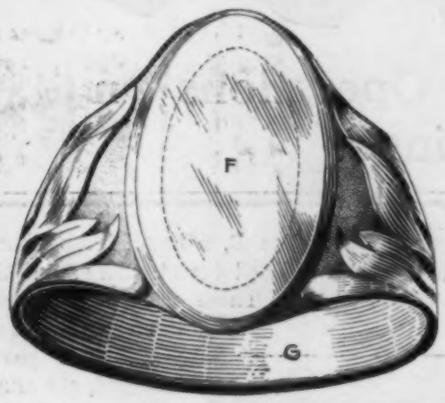


FIG. 2. ONE-PIECE SIGNET RING

held at that point by a round-head machine screw, and after placing the blank in the set place this stripper is swung around to cover this, so that its notch fits under the round-head machine screw at the other corner of the die. The punch is shown at the left of the die.

The next operation is known as the roll-plate process, so called because the upper portion of the band where

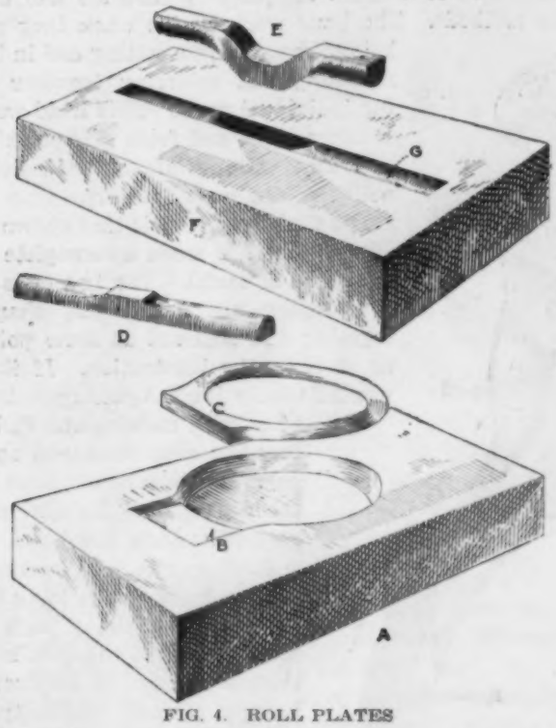
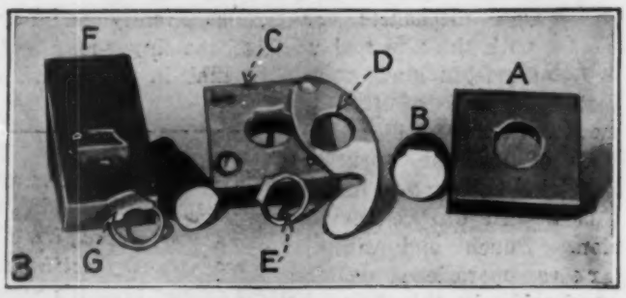
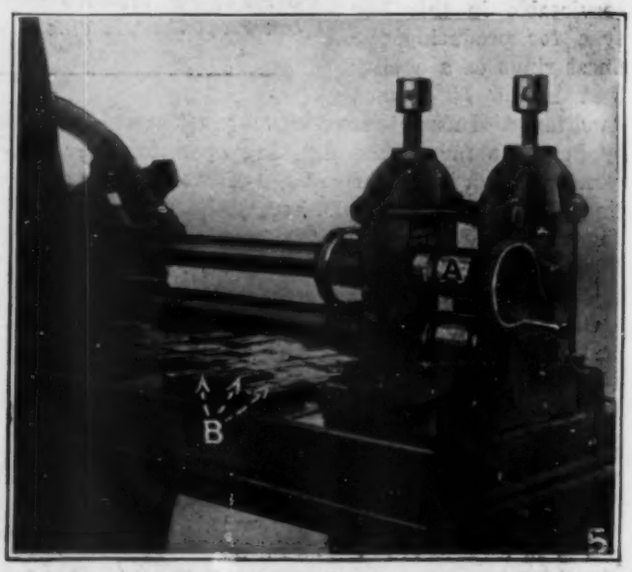


FIG. 4. ROLL PLATES

the filigree is to be placed is not required to be of as heavy metal as is the part which surrounds the finger, and to reduce this section the operation is done by the roll-plate method. The roll plate for this punching is indicated at *F*, and at *G* is shown the metal piece after this part has been rolled out. This operation is also illustrated in Fig. 4, in which *A* is the roll plate, showing the ledge *B*, where the section of the metal will be reduced in thickness, and the piece *C* above this section before it has been rolled. It will be observed that this rolling operation spreads this portion of the blank so that its thinner section will cover more area and save the material required for the first punching.

Another type of roll plate shown at *F* is used to thin the metal at the ends of heavy signet rings where it surrounds the finger, as at *C*. An edge view of a blank as it comes for a signet-ring punching is shown at *D*. This is sometimes bent up in the shape *E* before placing in the roll plate. For other rings it is left straight. The operation is to reduce the ends of *D* to a finished section, as indicated at *G*. This is accomplished by laying the punching in the correct roll plate





FIGS. 3 AND 5. DIES AND ROLLS FOR RING MAKING
Fig. 3—Dies for blanking and rolling ring parts. Fig. 5—Rolls and roll plates

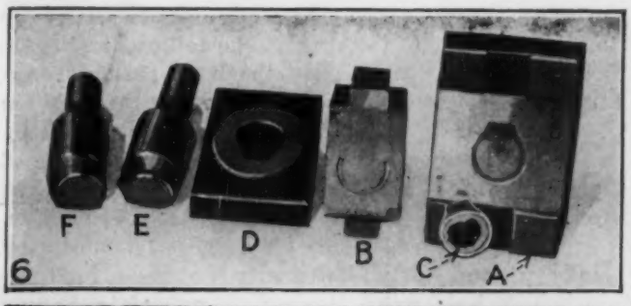
and passing it between a set of rolls a number of times, by which the ends of the metal are thinned down and forced out to fill up the recess.

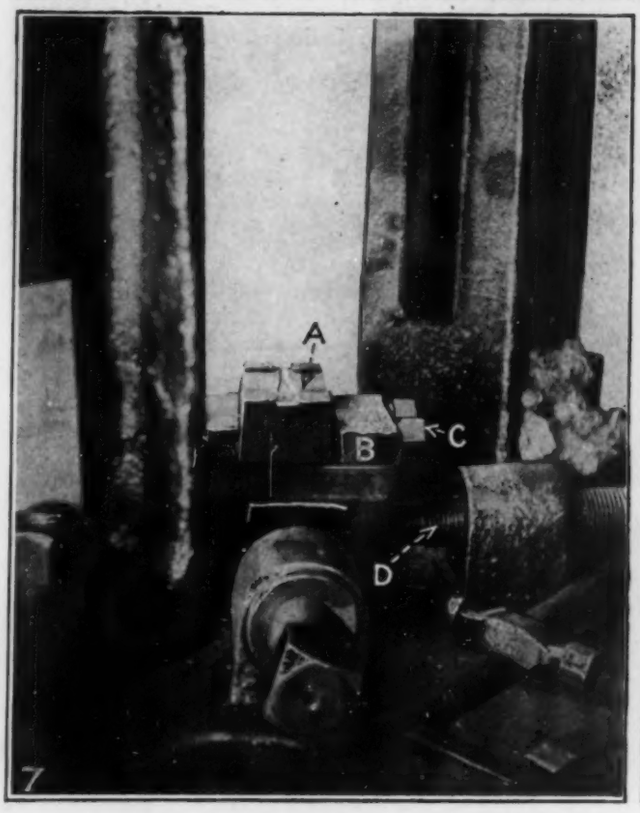
A set of rolls used for this purpose is shown in the illustration, Fig. 5. Here the actual operating part of these rolls is the portion *A* through which the roll plates and contained ring parts are passed. A number of roll plates for different sections of rings are shown lying on the table of this set of rolls, at *B*.

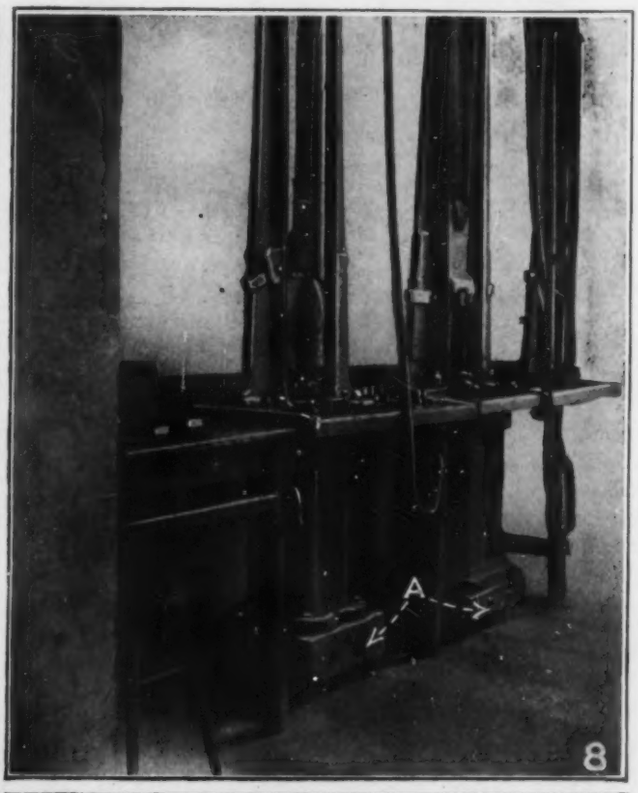
The next operation on these ring parts is to strike on the embossing. This is done under a small drop hammer, the weights of the drop hammers used for this work ranging from 50 to 250 lb., with a fall of from 3 to 4 ft. The die used in this instance is illustrated in Fig. 6 at *A*, which shows the outline of the embossing. The force or upper die used in connection

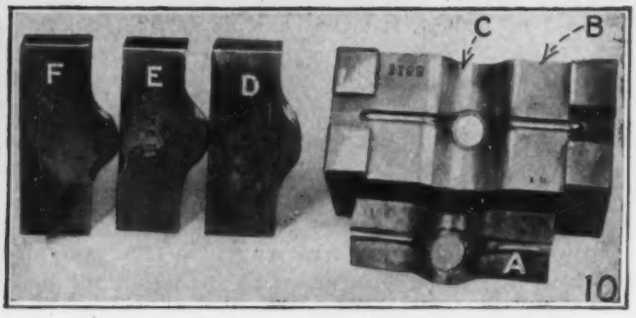
with this is the part *B*, which is contained in the hammer portion of the drop. It will be noticed that it has been recessed on its face to take care of the thicker portion of the ring stock as it came from the roll plate. The product of this drop is shown in the piece at *C*, where the metal is clearly shown as it was embossed by the die. After this embossment the die *D* and the two punches *E* and *F* are used for trimming.

in the hammer by means of setscrews, so that there will never be any tendency toward shifting. This method of holding the force also differs from the one usually employed in which the force is fastened to the top die head by means of black wax. The force is placed in the correct position on the lower die, and then the hammer is lowered and pressed down on it, and the force is stuck or attached to it by means of









FIGS. 6, 7, 8, 10. TRIMMING AND EMBOSSING DIES, DROP HAMMER AND METHOD OF HOLDING DIES
Fig. 6—Dies for embossing and trimming. Fig. 7—Method of holding die in hammer anvil. Fig. 8—Drop hammers used for embossing and shaping. Fig. 10—Set of ring-forging and embossing dies.

The Jones & Woodland Co. uses six drop hammers for different kinds of this work, and their installation is indicated in Figs. 7 and 8. Fig. 7 shows the means by which the embossing dies are held in the anvil setting, the die *A* being securely clamped in the block *B* by means of the setscrews *C*. In a way this method supplies a supplementary die block because the dies themselves are so small that they could be held and adjusted with difficulty. This supplementary die block *B* is held in position under the drop and adjusted to the correct position by the setscrew *D*, which forms a portion of the main anvil block. This method can readily be seen from the illustration. The upper die block, which is known as the force, is similarly held the coating of black wax. This suspension is sufficient for one blow, but a shift occurs and the operation must be repeated after each time it is struck.

Two of the drop hammers are shown in Fig. 8, and being located on the third floor of the building it is of course desirable that the blows from them shall not transmit any vibration to the building and its foundation. This has been successfully obviated. The foundation, Fig. 9, is of 14 x 14-in. timber extending from a concrete footing in the ground below the building in a vertical column up to the third floor of the building; here it is capped by the pieces *A*, which are also shown in Fig. 8. These pieces are bolted to the timber column and support the base of the hammer.

It will be noticed that the floor is independent of the hammer, so far as sustaining it is concerned, although it acts as a guide to prevent any side swaying. However, this action would not cause it to transmit any vibration.

The die-making operations for the drop-hammer work are interesting, and may be better understood from the illustration, Fig. 10, which shows a die for embossing a signet ring. The first operation was that of making

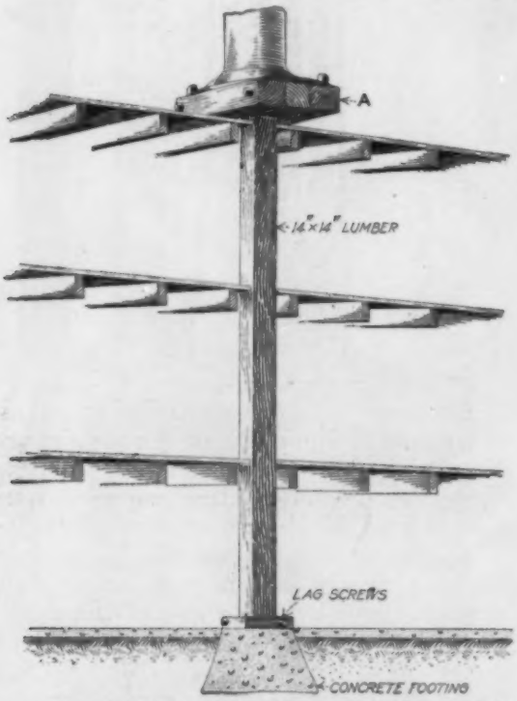


FIG. 9. FOUNDATION STRUCTURE FOR DROP HAMMER

the hub shown at *A*, which in relief is a master cut of the desired form of the ring backed up by the block upon which it is cut. From this hub the forcing die *B* is made. The practice of this company is to make the hub in a half portion rather than in the whole portion shown. In this way half the labor is eliminated, and the hub is just as useful, because after it has been used to strike one side of the die it is reversed and strikes the opposite end, this being possible only when the two ends or sides of the rings are duplicates of one another. These hubs are made of high-grade tool steel and hardened before use.

The die block *B* is made up of soft-annealed tool steel, and the main groove *C* is cut through it. Mounting the hub and die in a drop hammer a blow is struck with the hub on the die, which to a certain extent outlines the high spots on the hub. These high spots are relieved in successive operations, cutting them down a little at a time with hand tools and chisels until finally the die is worked down to the requisite depth. By this method the points on the die itself which would be the grooves in the hub are raised up into higher relief and aid greatly in obtaining a high, sharply relieved background on the ring stamping.

To the left of the die are shown three different sets of forces, *D*, *E* and *F*. They are used for obtaining different types of rings, such as a gold-face signet ring, which is comparatively thin; one for a flat-face stone, which will take a little thicker ring, and one for a deep stone, which will require a ring much thicker in this center portion. By making these three depths of forces the same die will be suitable for all purposes. The result is that while with the deepest force which exactly fits the die practically no fin will be left for trimming, on the other forces an increased thickness of fin is left in the middle, but is readily trimmed off, much more readily, in fact, than to attempt to file the ring thinner in this portion.

The use of these three types of forces is sectionally illustrated in Fig. 11. At *A* is shown how they enter the die; *B* shows the use of the most shallow force, and the shaded section indicates the thickness of the fin which must be trimmed off; in *C* is the fin left by the intermediate type of force, and *E* shows the use of the deeper force. After the embossing operation on the drop hammer the ring side, shown in Fig. 6, is taken to the trimming dies, Fig. 12. The untrimmed ring blank is shown at *A*. At *B* is a trimming die for rings which have been rolled thin on the roll plate, leaving the thick finger band as indicated in the blank shown

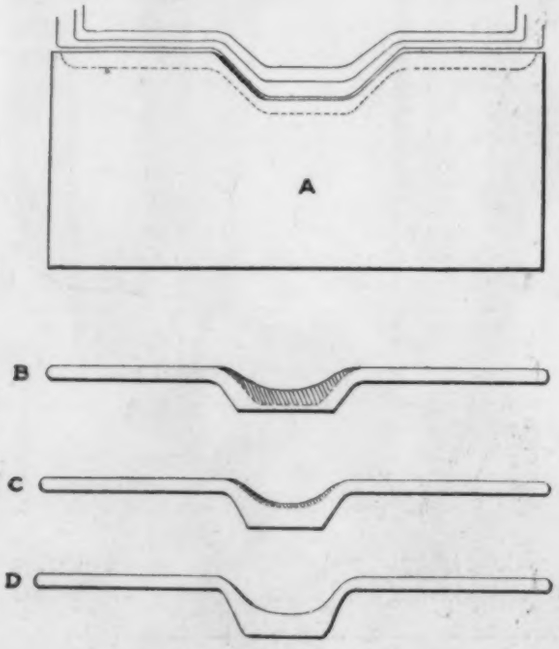


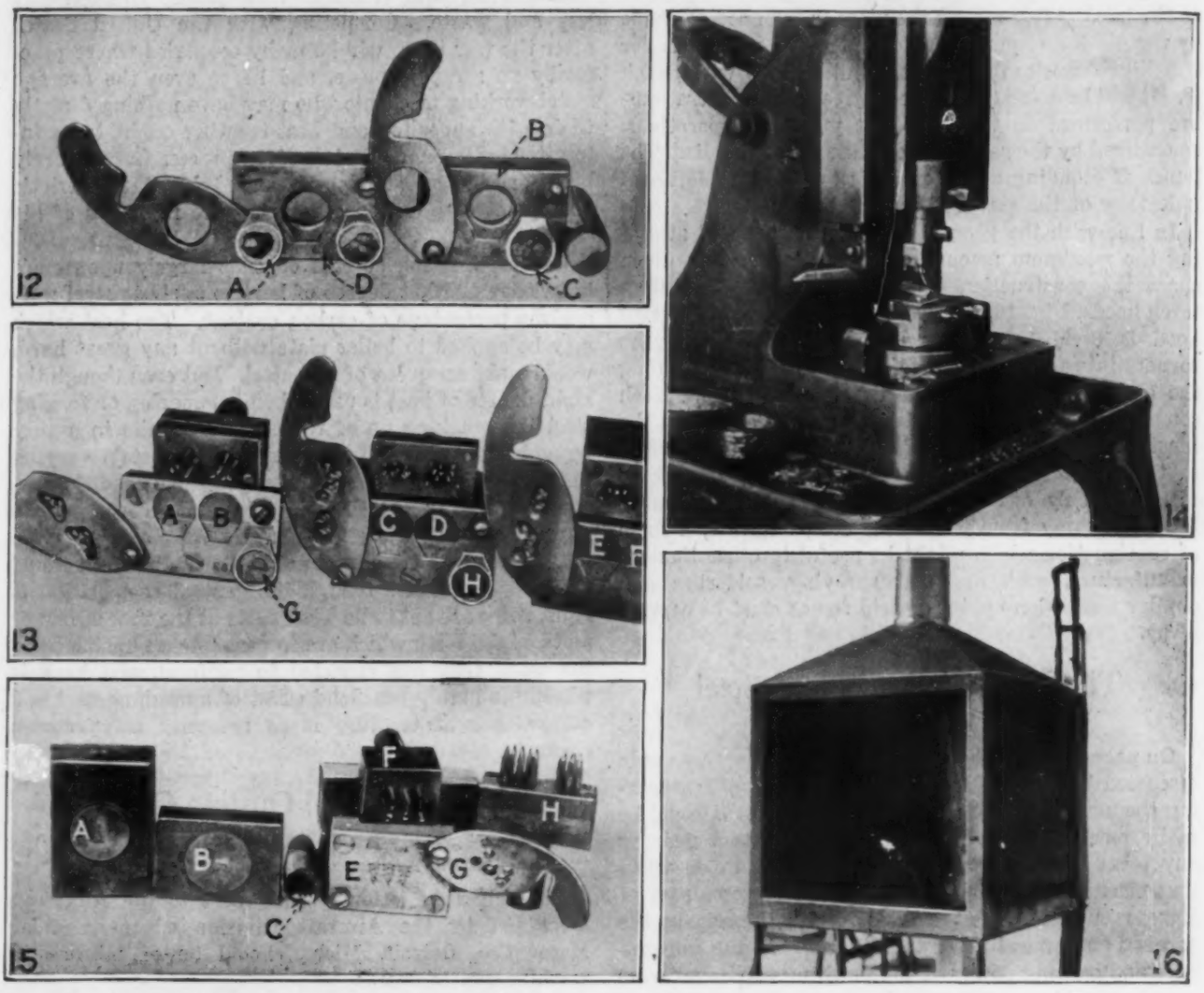
FIG. 11. DIAGRAM OF ROLLING DIES

at *C*. For very light-weight rings the blank will be of the same thickness over the whole section. As such blanks will require a special-trimming die that does not take care of the thick offset rings this is shown at *D*.

The ring is now ready for piercing the filigree opening, which is a very delicate piece of work. In this instance six dies are used for piercing the holes, each die piercing a certain number of openings so arranged that no opening in any one die will be close enough to the other to permit its breaking through on the die plate. It should be understood that these small openings are pierced in the recessed portion of the embossed figure on the rings, and the dies must be so accurately arranged that they only remove this background and do not touch the raised embossed portion. As these embossed lines are hardly more than hair lines this work must be very accurate and fine.

The dies are all built with set plates on their face

for lining up the blanks accurately in position with respect to the die and punch hole marks seen in Fig. 13. Referring to this figure the first operation is performed in the portion of the die *A*, and a second operation in that of *B*. While there are six distinct operations in piercing this one ring these have been divided into pairs, and thus only three dies are required, each containing two distinct operations. A blank may be placed in



FIGS. 12 TO 16. VARIOUS DIES, FOOT PRESS, AND SOLDERING APPLIANCES
Fig. 12—Trimming punches for embossed blanks. Fig. 13—Filigree-cutting punches and dies. Fig. 14—Footpower press. Fig. 15—Set of dies for end piece on filigree ring. Fig. 16—Exhaust hood and soldering torches

each portion of the set plate progressively, so that both portions will be in operation for every stroke of the press. You will observe the carefully built stripper plates, which prevent any withdrawal of the blank with the punch when it leaves the die. The punch in every case is shown above the die block. The ends of the punches show in fine white hair lines, and when one realizes that this L-shaped portion, which is most common in this particular design, is not more than a sixteenth of an inch long on each leg in the very largest punches, one may realize how very fine and thin the work is. The work is done progressively in the three dies, from *B* to *C*, then to *D*, and the final operations are made in *E* and *F*, the blanks before piercing being shown at *G*, and the final completely pierced blank at *H*.

Attention may be given to the details of the construction of these punches, as indicated in this and other similar illustrations. The punches are all made from about $\frac{3}{16}$-in.-diameter drill rod, and are fitted into properly spaced holes in the bottom plate of the punch holder. The bottom plate is attached to the stem holder by fillister-head machine screws and spaced by the two dowel pins, which can be seen in the bottom view of the punch plate, thus holding the die plate to the socket which fits in the punch stem holder of the punch press. Very accurate filing and fitting work reduces the lower end of the punch rod to the proper shape to fit the dies. At times only one or two are placed on the end of a rod, but in exceptional cases there have been as many as four of these tiny punches filed and sawed to a fit on the end of a single $\frac{3}{16}$-in. drill rod, each one standing up in its relationship to the others with much of the appearance of the root of a human tooth.

These dies are used in foot-operated punch presses, one of them being shown in Fig. 14. The manufacturer states that he has never found it necessary to use subpresses, even for this very fine and accurate work; his presses are always maintained at the highest efficiency, and the slack always tightly taken up so that

there shall be no play in the slides. He never has any trouble from breakage of punches due to getting out of line with the die plates, and he states that even for very fine work the punches can produce as many as 10,000 pieces without any breakage of these finely pointed punch stems.

The sequence of operations in making the part *D* shown in Fig. 1 are performed by the set of dies shown in Fig. 15. The roll plate in this case is the part *A* at the left. After rolling the piece is trimmed to shape by the die *B* and punch *C*. The piercing operations for the filigree work are performed in the die *E* with punch *F*. It will be noted that these filigree-making operations, are performed in three distinct punching operations, as outlined by the set plates on the face of the die. The punch *H* standing at the right is to give an additional side view of the standard punch construction.

In line with the general idea of this shop of attaining the maximum amount of production in any given space the construction of the brazing and annealing torch hoods, Fig. 16, is a good example. This one small hood is divided by triangular partitions across the corners into four separate compartments for men doing the annealing or brazing of the jewelry parts. Each compartment is provided with a torch as shown in the illustration, and the work of one man will not interfere in the slightest with that of the others. It will be seen that only one exhaust pipe is required to carry the gases away from these four compartments, a form of construction which might be useful to other lines of manufacture, such as paint spraying, soldering and similar work where paint or acid fumes must be carried away.

The Heat Treatment of Steel

By Paul Kreuzpointner

On page 829, Vol. 48, the annealing of gears was ably discussed by C. R. Poole, but it stopped with preparing the material to be used for gears so that it could be easily machined. But what of the work that gear or any other part of the machine will have to do when that machine is put in service, perhaps in some part of Europe or Asia, and breakage results because in the forging and annealing of these parts only the convenience and earning power of the finishing machinist were kept in view and not the maximum wearing qualities of the parts?

Then some keen-scenting, trouble-hunting German agent comes along, examines the broken parts, sniffs at them, throws up his nose, and with a contemptuous, "There is your smart Yankee for you. Why don't you buy from us and save expense and worry?" throws the parts under the bench. Thus American reputation is impaired, confidence is shaken, if not a customer lost, and the mechanics at home wonder why their machines do not sell as readily as they ought to and wish them to.

At the World's Columbian Exhibition at Chicago in 1893 Krupp had a set of open-hearth-steel locomotive-frame castings on exhibition which attracted much attention among those interested, because at that time the heat treatment of steel was still in an experimental stage in this country. But those locomotive frames served to produce widespread activity among investigators trying to penetrate the secrets of heat treatment, and today the mechanic who disdains to familiarize himself with the primary principles of heat treatment and its results is not a first-class workman.

Steel forgings and castings are annealed to improve their physical structure, and if it is not done then there will be scrap—scrap at the home plant and scrap at the plant where the machine parts break. And if one firm accumulates a larger scrap pile, under similar conditions, than another firm it means incompetent management, loss and waste. Competing with the United States after the war there will be many countries where practically no scrap is made, and hence even the average metal-working mechanic who may have nothing directly to do with annealing and heat treating ought to be interested in the fundamentals of the process from a purely bread-and-butter standpoint and from the patriotic standpoint of a citizen conserving the resources of his country.

In heat treating success depends largely upon one's knowledge of what degree of heat to apply to steel with a given percentage of carbon content. The heat which may be applied to boiler plate without any great harm would make scrap out of tool steel. But even though the right degree of heat is used when hammering or forging steel the breaking up of the crystals results in a very irregular structure of the metal, the crystals varying in size as well as in hardness. This same condition exists in a casting as well as in a forging. Now, suppose a gear is made out of such a casting or forging. Even if there were no trouble in machining it the teeth would soon break, because though the general composition is right there are apt to be weak spots at the root of one or more of the teeth which are in consequence unable to do the work they are expected to perform, and here is where the highly beneficial effect of annealing steel and otherwise heat treating it as necessity may require comes in.

Machine-Tool Outline Cards

By C. B. Owen

Aircraft Division of the Cadillac Motor Co.

The following letter recently sent to the *American Machinist* by the Aircraft Division of the Cadillac Motor Co., Detroit, Mich., should be of interest to machine-tool builders:

"I wish to ascertain if any of the machine-tool builders are prepared to furnish outline cards showing the floor space occupied by their various machines.

"Such outlines drawn to a scale of ¼ in. per foot and punched out to the approximate shape of the machines are very useful in making a machinery layout for a new job or for a new plant.

"I am referring this question to you as I recall having seen this question discussed in the *American Machinist* (page 1060, Vol. 47, and page 339, Vol. 48). Such outline cards could be used for advertising purposes to good advantage and could be mailed to the purchaser on receipt of orders for machines. The purchaser would thereby be provided with a set of these cards in advance for laying out the machine operations for which the machines were ordered.

"Several different equipment engineers have expressed to me a desire to obtain such outlines if possible.

"C. B. Owen."

Work in a Texas Repair Shop

By FRANK A. STANLEY

This account deals with a varied line of work in the blacksmith shop and structural department of a big smelter in the Southwest. It describes the guarding of machine gears and pulleys; bending, forming and welding operations and some special tools.

THE repair department of the El Paso Smelter Works, El Paso, Tex., handles in its structural department all the material required in the construction of new buildings the headpiece shows an interior view of the blacksmith and structural shop in which a number of long, heavy girders are seen in course of preparation in the main aisle of the building. In the background of this view will be noticed a row of heavy rolls, punches and shears which extend along the east wall of the shop. The shop is 160 ft. long by 72 ft. wide and has standard- and narrow-gage tracks along the main aisle and under the ways of the overhead traveling cranes. Along the west half of the building there are two steam hammers, a row of blacksmiths' forges and anvils, furnaces and flanging apparatus. The opposite side of the shop is fitted up with punching, shearing and drilling machines, grinding wheels, bending rolls, etc., all being electrically driven. These tools are served by jib cranes having 18-ft. jibs which swing out over the center of a railroad track running through the shop, and so located as to enable two or more machines to be served by each crane.

Machine Guards

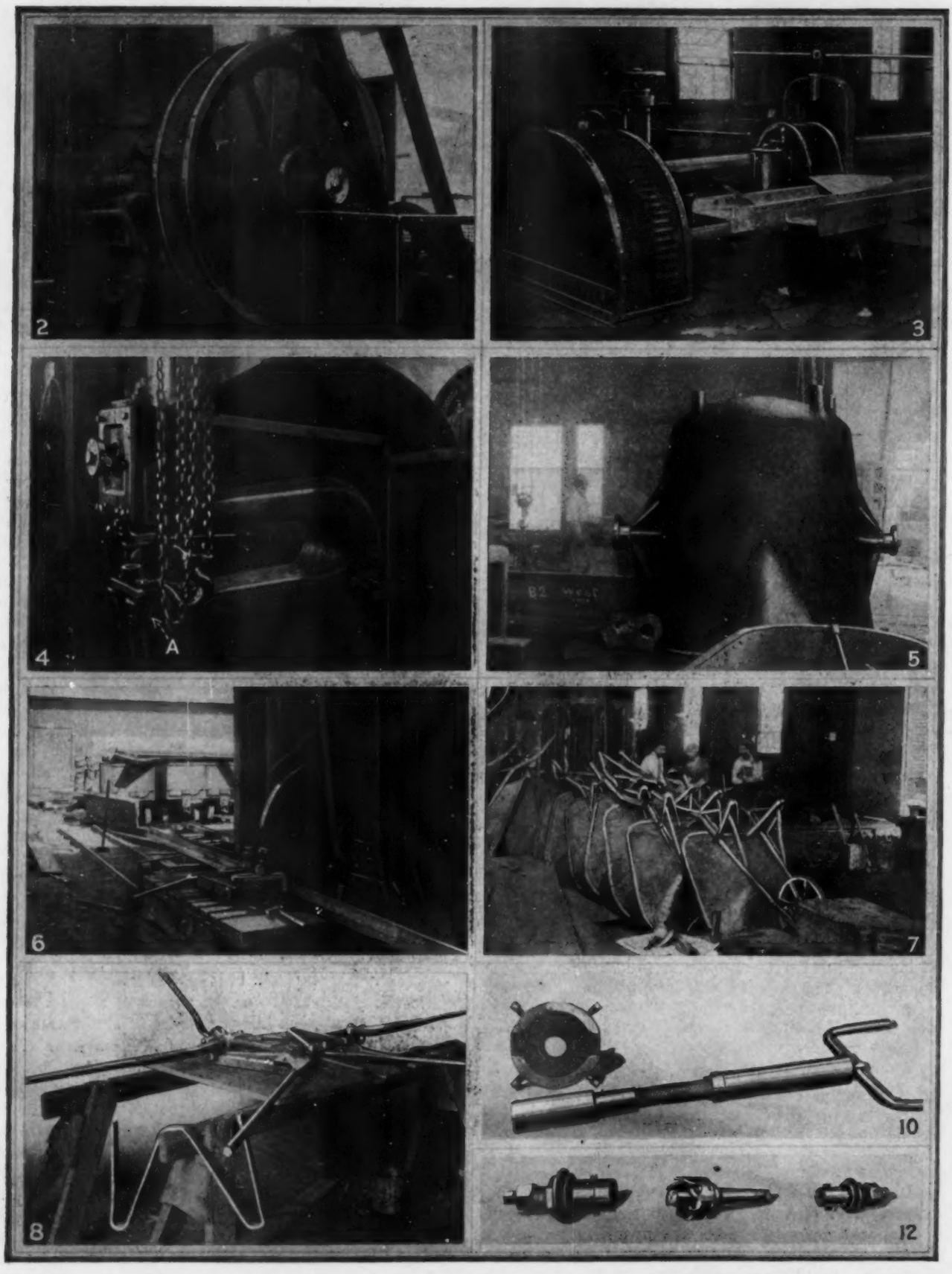
An important feature in this department is the thorough system of wire guards for completely covering all exposed gears and pulleys and for inclosing belts that would otherwise be a source of danger to the workmen. In this connection Figs. 2, 3 and 4 will be of interest, as they illustrate typical forms of guards and their methods of application to various machines. In Fig. 2 is shown the belt and gear guards at the rear of a big shear. The belt guard is a pulley guard as well, as it is in the form of a wire fence 4 ft. high and extending nearly to the top of the heavy flywheel on the driving shaft of the shearing machine. The gearwheel on the machine, which is operated by the pinion on the driving shaft, is 7 or 8 ft. in diameter and about 10 in. wide across the face. The guard for this gear is made up of heavy, coarse-mesh wire netting riveted to light angles bent up to form a circular frame, the wire netting being placed in the front and back of the gear as well as around the outside to inclose the teeth. The guard is supported by a rigid metal frame secured to the machine housing.

Similar care has been exercised in guarding the heavy plate rolls, illustrated in Fig. 3, where all gears are shown to be completely inclosed by wire mesh riveted to angles that are bent to the requisite form for carrying the netting over the gearing and along the outer and inner faces of the wheels.

The punching machine in Fig. 4 has complete gear guards at the rear, which have the same features as the inclosing guards described in connection with the shear illustrated in Fig. 2.

Welding Operations

Necessarily a good deal of the work coming to the shop is for parts requiring welding, and for this purpose an oxyacetylene apparatus is used extensively. In this connection reference may be made again to Fig. 4, which illustrates a welding job on the punching machine there shown. This machine, while operating on a very heavy piece of plate work, was broken across the lower jaw at *A*. In making the repair a sand mold was built up at the front of the work to control the metal melted by the torch and the acetylene flame was then applied to the iron rod, causing the metal to flow down over the broken face of the jaw and build up the end of the work to the thickness and width of the original part. The outer end of this built-up jaw still shows the slightly rough appearance in which it was left by the process, the photograph having been taken before the work had been dressed off at the end.



FIGS. 2, 3, 4, 5, 6, 7, 8, 10 and 12. GEAR GUARDS, REPAIRS, PRODUCT AND TOOLS

Fig. 2—Heavy shearing machine with gear and pulley guards. Fig. 3—Guarded plate rolls. Fig. 4—A punching machine repaired by oxyacetylene torch. Fig. 5—Converter with broken lug to be welded in place. Fig. 6—Home-made cutting-off machine. Fig. 7—A lot of steel wheelbarrows made in the shop. Fig. 8—Bending apparatus for forming barrow legs. Fig. 10—Portable boring bar. Fig. 12—Some handy shop tools.

Another interesting piece of work in the welding department is illustrated in Fig. 5. This shows a large converter with one leg torn off from its base, which must be welded on before the apparatus can be returned to service. The lug may be seen lying on the floor to the left. The irregular outline at the bottom shows the point of breaking. The surface to be welded is about 12 in. long by 2½ to 3 in. wide.

The cutting-off machine illustrated in Fig. 6 was made in this shop, and consists of a short, belt-driven spindle carrying a 36-in. cutting-off disk made of $\frac{3}{16}$-in.

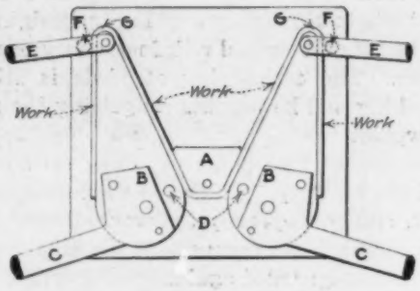


FIG. 9. LAYOUTS OF BENDING DEVICE

plate. This plate has no teeth, is driven at very high velocity, and severs the work by friction.

Over the top of the disk and extending downward nearly to the center line is a sheet-steel guard which incloses the top of the cutting disk nearly to the point of contact with the work. The spindle is mounted in boxes carried in brackets secured to the front end of a heavy steel frame, and the latter is fed forward by a power-operated gearing and screw to feed the disk through the work. A handwheel at the side provides a means of operating by hand in making adjustment or when otherwise desirable.

At the front of the frame housings is a heavy cast-iron work table with slotted face upon which steel angles, channels, bar material or other work may be secured for cutting off. Although a vise may be applied to the table for holding the material the work is customarily secured by a pair of heavy straps and bolts which are applied at points close to the spot where the cut is to be made.

A Blacksmith-Shop Product

Numerous parts used in the smelter works are made in these shops, as well as a complete line of wheelbarrows, shown in Fig. 7, the greater part of the work on which is done in the blacksmith shop.

An interesting feature in connection with this work is found in the methods applied to the bending and forming of the barrow frames, including the standards or legs under the rear end of the body. A special bending rig for these parts is shown in Fig. 8 where one member, completely formed, is hanging over the end of the trestle while another, bent to shape in the fixture, is ready for removal when the two forming levers at the left of the fixture have been swung back to release the work.

The piece bent is ¾ x 1½-in. stock. The method of operation in the fixture will be understood from the illustrations, Figs. 8 and 9. Referring to the latter, *A* is a form block for shaping the center of the work to the desired angle and curvature, and *B* are two forming arms operated by the two long levers *C* at the front of the apparatus. When these levers are swung around straight in front, the tapered forms or jaws *B* lie parallel to the front of the fixture and allow the straight bar of material to be dropped into place against the outer face of form *A*. The levers *C* are then operated one at a time to swing the jaws *B* inward and bend the work to the C-shape indicated in the illustration. When the jaws are closed to the proper angle, locking pins *D* are pushed down into holes in the fixture base, thus holding the jaws *B* in their closed position, as shown. The levers *E* (which are pivoted to the ends of the jaws *B*) and the rolls *F* on the under side are used to bend the work at *G* to the desired radius, as determined by the curved ends of the main jaws, and at the same time force the ends of the work against the outer edges of jaws *B*, thus bringing the piece to the desired shape.

A type of boring bar which has been found convenient in various parts of the plant is illustrated in Figs. 10 and 11. This is a hand-operated bar, and has been used on different jobs where a light cut was required. In Fig. 11 it is shown set up for taking a slight amount of stock from the bore of a big gearwheel. The gear is shown with its face flat upon suitable supports, and the bar in vertical position with the lower end in a step that is fastened to the floor. This bar is an

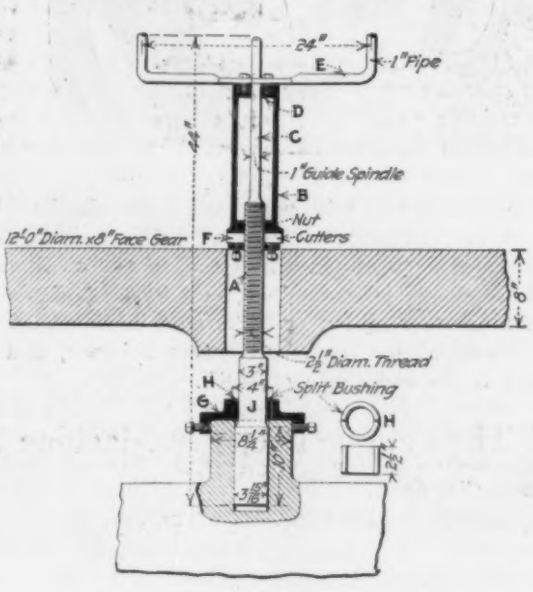


FIG. 11. DETAIL OF BORING BAR

upright shaft with its lower end enlarged to fit the step and having a long, threaded portion at *A*, which passes up through a nut fixed in the bottom of the sleeve *B*. The upper end of the bar is reduced to 1 in. in diameter at *C* and passes through a guide *D* fastened to the upper end of the sleeve. A double-ended operating handle *E* is secured to the sleeve by two screws which pass through holes drilled in the flatted portion at the middle of the handle. The cutters are carried at *F* and are fed down through the work by rotation of sleeve *B* and its nut upon the threaded portion *A* of the bar.

Additional support for the bar is provided at the lower end by means of the clamp plate *G*, which is fastened to the top of the step by setscrews tapped

through the lugs on the outside of the casting. This cast plate *G* is bored out large enough to allow the big end of the bar to be passed down through it, and the two halves of the split bushing *H* are then placed in the bore to fit the neck of the bar at *J* and support it at this point.

Some other tools made use of in different departments are illustrated in Fig. 12. The two outer tools in the group are valve seaters, which in service are screwed into the work by the threaded caps and operated

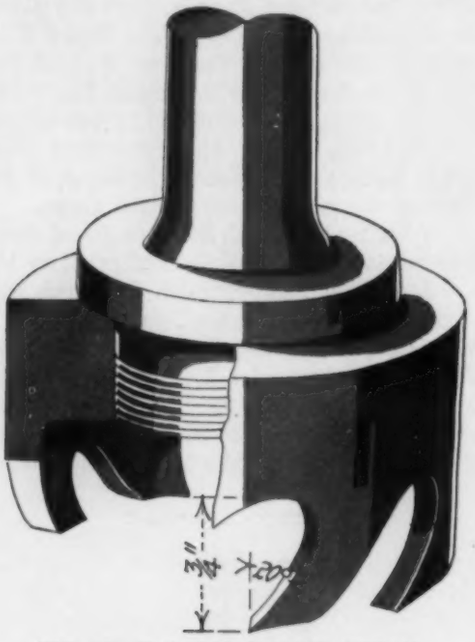


FIG. 13. HOLLOW CUTTER DETAIL

by the square heads in the tops of the shanks. The tool in the center is a form of hollow mill or core drill, which is made in various sizes for cutting out holes in plates, tubes and so on. Fig. 14 shows the method of securing the cutter proper to its shank, the proportions of the teeth and spaces between, and the cutting angle and depth of teeth.

The Fatigue Factor in Machine Designing

BY E. F. JOHNSON

The design of a contrivance which consists of only a few parts can be developed on the drawing board until it is nearly mechanically perfect in every detail. Its simplicity allows the idea as a whole to be easily comprehended by the mind of one who is invited to express an opinion as to its practicability, and advantage can be taken of suggested improvements or constructive criticism.

The problems involved in the design of a complicated machine are so numerous and some mechanisms so intricate that it is almost impossible to submit all details to such a thorough analysis as might be desired. When the principles of construction for a machine have been decided upon, the designer is generally given the responsibility of working out the required mechanical arrangements, and if he is a man with considerable initiative he is often given a free rein. The principle of coöperation should be adhered to, however, to obtain the best results.

The work of designing, perfecting construction details, and the production of working drawings for a complicated machine is a task of large proportions. Various ideas and schemes must be analyzed and discarded before a fitting mechanism for a purpose can be decided upon.

The fatigue factor should be given more attention than is generally the case. Better designing, increased speed in producing the working drawings, and reduced costs will result if the designer is given good support. A tired mind or body is not 100 per cent. efficient.

A good method is to allow the designer one or more able assistants to aid him in working up designs. Under this plan he gets the mental relief necessary to retain his enthusiasm. The exchanging of ideas is stimulating and refreshing and he benefits by getting the other fellows' viewpoint.

The worker who is plugging along without proper support loses his "pep," which is so necessary to accomplishment, and consequently the work drags.

By the coöperative arrangement the employer is to a great extent safeguarded against costly errors in design due to individual judgment.

A designer should be allowed to retain his assistants until he can no longer provide work for them. This may not always be practicable, as other work may be considered more urgent, but is a point which should be adhered to as closely as possible.

The ambitious designer will plan or schedule his work to some extent and the loss of an assistant at a time when he can ill spare him will put him out of his stride and delay the progress of the work.

To impede the momentum of work which is in full swing is expensive and should be avoided.

Coöperating with the designer as far as circumstances will allow is only the part of good system and will benefit all concerned.

Loyalty in the Shop

BY DANA E. JONES

Secretary of the Manufacturers' Association of Erie, Penn.

In the *American Machinist*, page 894, Vol. 48, we noticed an article entitled "Loyalty in the Shop," and we take a great deal of pride in calling your attention to the Third Liberty Loan campaign in the city of Erie, Penn. Workers in 116 shops participated in the campaign, and, of these, 58 shops subscribed 100 per cent.

One shop having 1203 employees subscribed 100 per cent.; one with 995, 100 per cent.; one with 554, 100 per cent.; one with 435, 100 per cent.; one with 427, 100 per cent.; one with 423, 100 per cent.; one with 370, 100 per cent.; one with 345, 100 per cent.; one with 284, 100 per cent.; one with 4600, 99.2 per cent.; one with 4800, 97 per cent.

Several of the other shops where 100 per cent. of the employees bought bonds employed 100 or more men. There were also a number of 100-per-cent. shops employing less than 100 men.

The total amount of bonds subscribed for by 25,686 out of a possible 27,000 employees in this city was $1,814,300, which we believe is a record for employee bond subscriptions not equaled by any other city in the United States, and one which everyone in Erie is very proud of.

Appointing Machine-Tool Agents in France

BY PAUL AURIOL
Engineer, Paris

REFERRING to the articles in the *American Machinist* in Vol. 47 and Vol. 48, on the best way of selling machine tools in Belgium and France I believe it may interest your readers to know of the Paris Chambre Syndicale des Importateurs Français de Machines-Outils and the opinion which prevails here on the subject.

This organization embraces the agents, dealers and consulting engineers who for the past 25 or 30 years have devoted their technical and commercial capacities in advocating the adoption in France of American improved or special machinery. Its object is of national as well as private interest. The financial burden upon the country following the war will be enormous, and it is by no means a matter of indifference to the nation that the gold export in buying foreign machine tools be reduced by the amount of the merchant-commission return.

Next to this its aim is to guard the reputation of the members against improvised, unqualified or undesirable dealers, and to afford to the foreign machine-tool builder a guarantee that his interests are placed in honest hands.

I personally witnessed the efforts which were made some 25 years ago by many of the promoters of the Chambre Syndicale to introduce American machine tools in France, particularly the characteristic types of American ingenuity such as the turning and boring mill, called here *tour vertical* (vertical lathe). I still remember as if it were only a few months ago the remark of a friend of mine, an engineer in a steel and ordnance works, to whom I had suggested the adoption of a large-sized vertical lathe for turning gun-turret roller paths:

"This tool is quite American indeed, but we would have no chance to get it accepted by any of our practical men." It was, however, not only accepted a little later but soon regarded by French engineers as an indispensable feature of the modernly equipped machine shop, and were I the fortunate American maker I should much prefer my old French agent to some of the newcomers who are so prompt to inflate their merits when soliciting war-time orders obtained under circumstances which you will allow me to explain.

Necessity for Haste

When our industrial districts were invaded and it became evident that the war would last much longer than any could have expected, it was necessary to procure machine tools by all available means and to buy them *à bureau ouvert*, whatever the make, style or price, without any stipulated guarantee, the terms being entirely at the seller's discretion. The mistake made by both the machine-tool consumers and makers was to listen to the offers of those newborn dealers of all kinds who promised more than they have been able to perform.

To show how easy it was then for a man not particularly scrupulous to sell machine tools I may mention the following question asked of me in 1915 by a works manager in need of hydraulic presses: "Could you not procure them from a German maker?" I cannot affirm that this question was not a joke, but I would not be surprised to learn that machinery from hostile countries had been introduced into France since 1914 through some of the occasional and more or less neutral dealers raised up by the war.

In consequence of the above, and for other reasons hereinafter mentioned, the manufacturer should consider it to his advantage to give the preference to the "native son." In any case the domestic house will not give up, and the question for the manufacturer will be whether he will have it for him or against him.

For some time after the war the matter may not be important, but times of keen competition will come again, and let us then suppose on the same inquiry two agents or dealers—one French, the other British or American. Nine times out of ten the French buyer will find before him a personal connection, often an old schoolmate, while the machines submitted by both sides will be about equal. Is it necessary to say what the conclusion will be?

Granting of Preferences

The inquirer may be a government arsenal, less susceptible to friendship or personal connection; but even so the preference will be granted to the "native son" for the following reasons: We must expect that our arsenals will act more conservatively than they did in prewar times towards foreign agents, through whom, consciously or not, the German government was kept informed of our schemes and actual capacity in the matter of war material; and the financial condition of the nation will imperatively demand the adoption of a general policy, or even of legislative measures, against all forms of gold export of a permanent character. A government aware of the interests of the country will certainly avoid extending a welcome to the foreigner wherever a "native son" will answer the purpose. The Chambre Syndicale will not fail to call our government's attention to the fact that private interests are a part of the nation's general prosperity, and it will be qualified to speak thus rather than the war-born dealer whose profession of friendship and desire to help the French government is somewhat ridiculous, especially since the recent measures taken to restrict financial speculation in machine tools.

Everyone in the United States will be careful to avoid going beyond the legitimate returns when called upon to coöperate in the restoration of the Belgian and French industries.

It is not generally realized that a main cause of the present war was the unlimited avidity of the Germans in the French market and the resistance which was finally offered them by French industry. The three stages of German enterprise on the French market were as follows: Selling through the French agent; selling through the German agent or house established on French territory, often under a French name; establishing a monopoly to cover certain lines of manufacture,

make prompt deliveries from consignment stocks, and offer favorable terms of payment, and at last superseding the French manufacturer by combines in which the German element gradually became preponderant.

It is gratifying to note that most of our leading works, placing the future of the nation before their own immediate interests, refused to lend themselves to such attempts, and I will relate an example which illustrates the situation just before the outbreak of the war.

A friend of mine, owner of important works in the Paris district, was solicited by German competitors to promote a big "French" company, and in July, 1914, about a fortnight before the beginning of hostilities, they came to Paris to make a last effort in this direction; but they met with a definite refusal, upon which they left, saying vexedly, "Good-by until August or September next." It soon became evident that they had thus alluded to the rush of the German army *nach Paris*. There is evidence that this criminal war is the result not only of militarism but of the barbarous commercial insatiableness of the German nation.

Let me also mention in a friendly way, with the frankness which must prevail between allies and friends, the following remark from the general manager of a shipyard and engine works: "Now that we may expect to get rid of the Germans we fully hope to remain masters at home." This remark will show how cautiously it is necessary to deal with the individual character of our countrymen.

American manufacturers working at home for their invaded allies can reasonably expect profits and gratitude, and I feel confident that they will be fully content to leave to the French agent, on French soil, the selling part of their French business.

Type of Agents

Now what kind of agent should the American manufacturer appoint, and upon what basis? No general rule can be stated. Heavy machinery such as armor-plate rolling mills and standardized machine tools of small or medium sizes may be differently dealt with. The agent should be given the greatest latitude to deal with the customer as if he himself were the manufacturer. He should not be considered by the manufacturer merely as a means of safeguarding payments, but rather treated as a friend and associate, with a personal interest in the development of the business.

This is the only possible way in which to interest the high-spirited agent, conscious of his importance, anxious to merit the maker's confidence and proud of the results obtained. Of course any man whatever will not answer the purpose. Financial strength may be a consideration for the manufacturer, but it is not the most important factor; financial capacity to meet all emergencies may be second to aptitude in avoiding emergencies altogether.

In conclusion the French agent does not ask special favor or monopoly, dispensing with initiative or enterprising spirit. The past successes of the French dealer in American machinery, especially in the pioneer years, are contradictory of such an understanding. He only wishes to point out that there are ways of making business which will never have a future in France. Forestalling by financial or other means, peremptoriness in business relations, etc., may temporarily succeed; the French customer may submit to them for a time, but they will lead to difficulties. Using the "native son" as just good enough to act as a hireling under foreign supervision is a conception which will not meet with the approval of our countrymen.

Rehabilitating Disabled Soldiers and Sailors*

By Major Harry E. Mock

Since the United States entered the war many of the great economic and social movements which groups similar to this gathering have advocated have either become a reality or have made great progress toward fulfillment. These can be classified as the byproducts of the war.

By physical reconstruction of the disabled we mean the adopting of the very best medical or surgical procedures in order to obtain the greatest functional restoration in a diseased or injured organ or member of the body. Rehabilitation includes the mental and physical training of the disabled individual so that he can again be established as a useful member of society and further supervision until he has secured a firm grip on life as represented by all its economic factors.

All the nations engaged in the war have adopted methods of reconstruction and otherwise reclaiming their disabled soldiers for the purpose of returning them either to the firing line once more or to place them back into industry, agriculture, commerce, trades or some other line of work. The increasing number of permanently disabled men has made the problem in all these nations assume enormous proportions.

While the economic demand for man power in these countries is so great that every effort is being made to conserve all the remaining energy and working ability in these men yet most of the plans are based on the premise that it is a debt the nation owes these soldiers. Almost as much thought and inventive genius is devoted to artificial appliances to replace lost members as is given to solving the submarine menace. Schools and curative shops have been established in connection with hospitals, first to teach the men to use their partially restored members or their artificial legs and arms, and second to teach those who can never reënter their old occupations some new occupation. In most of the countries wonderful schools for the blind have been formed where they are taught to read and write and a useful trade. Besides these crippled soldiers there are many medical cases which need reconstructing and retraining to some line of work which will not be hazardous to them in their diseased condition. Of these the mental and nervous, heart and tuberculous cases make up the bulk.

In England the disabled soldier remains under military control until he has completed all medical and surgical treatment required in the hospital. Many of the hospitals have vocational training departments, but it is made voluntary on the part of the patient whether or not he chooses the training.

France and Belgium have excellent systems of re-

*Abstract of address before the twenty-third annual convention of the National Association of Manufacturers held at the Waldorf-Astoria Hotel, New York, May 22, 1918.

habilitation in certain centers. But a study of the plans for this work in all the nations shows that they are still incomplete and lack the coördination necessary to make them efficient.

In this country we will soon be facing the same problems with regard to our disabled soldiers. Congress has passed a very good war-risk or disability insurance act which will enable us to carry on a broad program of rehabilitation. It provides that in case of permanent disabilities, the injured shall follow such course or courses of rehabilitation, reëducation, and vocational training as the United States may provide or procure to be provided. If such course deprives the injured from gainful occupation, he may be retained in or reënlisted in military or naval service until the course is completed, with pay rate of last active service and allotments to his family. It also provides that no reduction in a man's pension shall take place no matter how successful he is in overcoming his handicap. But if a disabled man after being rehabilitated shows signs of retrograding or is disposed to live on his pension without working, payment can be stopped by the Insurance Bureau until such time as he corrects his ways. It provides for periodical medical examinations and other forms of supervision.

But the success or failure of our work must rest with each individual. We can form all kinds of schools and shops for vocational training; we can make this training compulsory; we can create a great machine for rehabilitation; but unless we stimulate ambition and the desire for this training, and, above all, unless we inculcate the idea of grasping every opportunity to make good by their own efforts in the hearts and minds of these disabled men, our whole scheme will be a failure.

Thus far our work in the Surgeon General's office has been along the lines of studying and preparing for this great problem, arranging for the establishment of hospitals in every one of the sixteen draft districts of the country (there will be at least sixteen of these general and special reconstruction hospitals), and mapping out our plans for curative shop and prevocational training. We realize that our program for reconstruction and rehabilitation must be made so comprehensive that it will fit in with the programs of existing civil organizations whose purposes are the same as ours must be when we come to the placing of war cripples back into civilian life.

Military Problem at Present

At present it is a military problem and, as such, belongs to the medical department of the army. Closely allied to it is the same problem in the navy and in the industrial army. Later on it becomes purely a civilian problem and enters the field of many federal, state, local and private civilian organizations whose duties it will be to complete the rehabilitation.

It is our duty also to work out a plan that will not only be applicable to handicapped soldiers and sailors, but that will include the handicaps in the industrial army as well—that is, reconstruction and rehabilitation after supervision and proper federal insurance for those disabled while employed in industries necessary to the continuance of the war. It is only a step from this scheme to a far-reaching plan that would include proper medical and surgical supervision, reconstruction and rehabilitation, and federal health and accident insurance for all workers and for all time to come.

A résumé of our plans for these disabled soldiers will better illustrate the scope of this work.

The disabled soldiers on their return to this country will be received at a large central receiving hospital. This hospital will undoubtedly be located at Staten Island. Here these patients will be thoroughly examined and each individual case passed on by a board consisting of both medical and vocational experts. From this central receiving point they will be distributed to (a) general hospitals; (b) special hospitals; (c) hospitals with special vocational schools; (d) direct home or to incurable hospitals. It is planned to have general and special hospitals in every draft district.

On their arrival at these institutions the necessary medical and surgical care will be administered. This problem will remain a truly military matter until complete functional restoration has occurred.

Aids to Medical Care

As an aid to this medical care and for the purpose of securing the greatest functional restoration, there will be established in connection with each hospital, physical units consisting of gymnasiums, hydrotherapy and massage rooms, and mechanical appliances. In addition, each hospital will have its curative shops where the men can indulge in light work of various kinds. The purposes of these curative shops are (a) to give mechano-therapy when indicated; (b) for their psychological effect; (c) for productivity and beginning vocational training where indicated.

Prevocational training schools will be operated in connection with each hospital. This training will be for the following purposes: (a) for curative therapy; (b) to teach new trades to those who may be unable to take up former occupations; (c) special schools, as for the blind, deaf, orthopedic and tuberculous cases, etc.; (d) for agricultural pursuits which can be taught in connection with some of the hospitals suitably located.

Some of this vocational training must be given in already established schools such as our state universities, where short courses can be arranged or regular courses adapted to our needs.

Many of the disabled soldiers, after hospital treatment is completed, will undoubtedly seek federal and state governmental work such as mailing clerks, mail carriers, guardsmen in national and state reservations, court clerks and all other civil service jobs. Therefore it is planned to establish free civil-service schools for the training of this class.

Others of the war injured, with no special training in any line of work previous to the war, and with no special qualifications for entering vocational training, will best be placed directly in some industry or trade. Special arrangements are being made with private commercial and industrial concerns for the practical training of these men. During this training period these men should be retained under federal pay and supervision. The training of proper teachers for these vocational schools is a very essential part of our present plans. Many successful cripples in this country have already volunteered their services as teachers to the

prospective war disabled. The practical training which such men could give is quite obvious.

Three of the best vocational experts in the country, representing commercial and professional schools, industrial schools, and agricultural schools, are serving as commissioned officers of the reconstruction staff of the Surgeon General's office and are devoting their entire time to the developing of this special branch of this work.

Therefore while we are making our elaborate plans for the reconstruction and rehabilitation of our disabled soldiers, a few of us are recommending and urging the conserving and reclaiming of our civilian forces as a most important war measure.

Thus, from our efforts to win the war and at the same time to pay the nation's debt to those disabled in the fight, at home or at the front, will come this great byproduct human conservation and reclamation.

New Call for Engineers in the Army

By Frank C. Wight
Associate Editor *Engineering News-Record*

Engineers are once more in demand as officers in the army. For the past six months or more applicants for commissions in this branch of the service have met with the statement that the quota was full and that except for special work, generally at the direct request of General Pershing, no more commissions as engineers would be given to men in civil life. Such vacancies as occurred would be filled by promotions of men already in the service. Our enormously increased army, in being and in prospect, has changed all this. On June 3, Gen. W. M. Black, Chief of Engineers, U.S.A., issued a call for about 2000 additional first lieutenants and captains in the Engineer Reserve Corps, and they will be immediately commissioned, sent to training camp and as soon as possible dispatched overseas to the Expeditionary Forces.

Qualification restrictions are mainly those of age. There are no commissions available in the grade of major or higher or in that of second lieutenant. The higher grades will be filled by promotions of well-qualified men now nearly a year in the service; the lower grades will be filled from the ranks or from the recent college-graduate members of the Engineer Enlisted Reserve. The age limits are 32 to 36 years for first lieutenant and 36 to 42 years for captain. These limits may be slightly increased or decreased, in certain cases, but no one within the draft age will be considered.

No set rules as to professional qualifications and experience have been established, except that the applicant must be engaged in the active practice of the engineering profession in one of its branches. An examining board will pass on the candidate's fitness. All applicants must be citizens of the United States and must be in good physical condition. Men now in the federal service will not be accepted unless they are specifically released by their chiefs as not being necessary to the conduct of the war.

A new method of selecting men will be adopted in the present campaign. Last year the candidates for commissions in the Engineer Officers' Reserve appeared before local army officers, who passed on their fitness. These officers might have been line men, or men in the artillery, medical or other branch of the service; in many cases indeed they had absolutely no qualification for passing upon the fitness of a prospective engineer officer as an engineer. The district heads reported successful candidates to Washington, where they were finally passed upon, but many well-qualified engineers never got beyond the local board, from whom appeal was difficult. This year a special examining board headed by Maj. Edward H. Williams, E.R.C., will tour the country, stopping at 33 cities, and personally examine the candidates who have passed the preliminary examination, which consists in filling out certain papers to be sent to Washington.

Applicants accepted by this examining board will be commissioned within a week or 10 days of the examination, and a few days after they will receive orders to report at an engineer officers' training camp, either at Camp Lee, Petersburg, Va., or Camp Humphries, Virginia, a short distance down the Potomac from Washington. After a course of training in military engineering they will be assigned to duty with the engineer troops for eventual service abroad. The commission is not final, however, because a candidate in camp may prove not to have the necessary qualities of a military leader. In such a contingency he will be honorably discharged. Each man's case will be carefully considered by a board of officers of the Engineers' Corps, U.S.A., just previous to the completion of his course of instruction.

Traveling Expenses

The Government will allow traveling expenses at the rate of 7c. a mile to applicants who may be commissioned, who will also receive, while in training camp, the full pay of an officer of their rank. They must provide themselves with the usual engineer officer's uniform, cap, puttees and tan shoes, but will be furnished a training-uniform outfit while at camp.

Applications for these commissions should be made as soon as possible to the office of the Chief of Engineers, Washington, D. C. The office will send back a series of blanks to be filled out with a general personal description designed to indicate the fitness of the applicant for a more searching examination in person by the examining board. Those selected will be notified when and where to appear before the board for the further examination.

The call for new members of the Engineer Officers' Reserve has an interesting background. As most engineers know, the reserve was formed before the war without any direct anticipation of its early use. It proved a most fortunate forethought, as without it the machinery for developing a proper engineer force last summer would have been immeasurably increased. As it happened, however, the system for commissioning engineers was ready, and by early summer a thousand or more engineer officers were available and many thousands of applications were on file in the War Department for other officers. Beginning then in June the first officers' training camp started with 2500 men, all of high professional grade. Of them some 2000 were commissioned. A second training camp of 1500 men of similar professional quality yielded 1300 officers below the rank of major. By this time, however, it began

to look to the department that enough engineer officers were in sight, particularly as there were on file some 8000 applications for commissions which had not been examined because of the filling of the available commissions. Furthermore the General Staff had figured that a certain maximum of troops could be maintained in France and that maximum demanded no more engineers than were then in the service in the ranks above second lieutenant.

At this time the heads of the army laid down the general policy that all commissions, with a rare exception in cases of specialists, should be filled by promotion from lower ranks, and that the second lieutenants should be obtained from the army itself, either the privates or non-commissioned officers. Draft-age men particularly were barred from consideration for commissions, except as they might be designated once they had taken their place in the ranks. This rule applied equally to the Corps of Engineers. Consequently word was sent out that no engineer commissions were available to civilians, and the third engineer officers' training camp was filled with men designated from the ranks and with some enlisted men of long service who had been promoted to be second lieutenants. A few of the long-standing reserve officers who got their commissions before last July were also in attendance.

This third camp was quite successful and some very good men were found in the ranks; so the fourth camp, just starting, was formed on the same lines except that the graduates of technical colleges who are members of the Engineer Enlisted Reserve were also included. This camp proved to be a disappointment in the class of men sent. To be frank, it looks very much as though a number of regimental commanders about to sail for France unloaded on the engineer school a number of their undesirables.

Readjusting Industries for War Work

For the purpose of developing new industrial resources to meet the war demands of the Government and quickly to disclose additional means of increasing production the War Industries Board has just established a Resources and Conversion Section. Charles A. Otis of Cleveland, former president of the Cleveland Chamber of Commerce and a member of the board of directors of the Chamber of Commerce of the United States, has been appointed chief of the section.

To carry out the plans of the War Industries Board it has been decided to divide the country into 20 regional groups and to organize each region through the commercial organization within the region. In each of these regions all kinds of industry represented in the membership of the business organization and all industries which may not be a part of such membership will be invited to coöperate.

The purpose of the regional system is immediately to make a careful survey of every section of the country to determine what industries not now doing war work may be utilized for such work, and also to ascertain what industries already engaged on work for the Government are able to take on additional contracts or increase their production of munition and war supplies.

Utilizing our local sections organization, President Main of the American Society of Mechanical Engineers has appointed the following members of the society to act as its representatives on each of the regional committees of the Resources and Conversion Section of the War Industries Board: Bridgeport, Conn., Harry E. Harris; New York City, G. K. Parsons; Philadelphia, Penn., Lewis F. Moody; Pittsburgh, Penn., J. M. Graves; Rochester, N. Y., F. W. Lovejoy; Cleveland, Ohio, F. H. Vose; Detroit, Mich., G. W. Bissell; Chicago, Ill., A. D. Bailey; Cincinnati, Ohio, Fred A. Geier; Baltimore, Md., William W. Varney; Atlanta, Ga., Oscar Elsas; Birmingham, Ala., J. H. Klinck; Kansas City, Mo., J. L. Harrington; St. Louis, Mo., R. L. Radcliffe; Milwaukee, Wis., W. M. White; Dallas, Tex., A. C. Scott; San Francisco, Calif., B. F. Raber; Seattle, Wash., R. M. Dyer; Boston, Mass., A. C. Ashton, and St. Paul, Minn., Paul Doty.

The president has also created a national committee of our society on Readjustment of Industries for War Work. George K. Parsons is chairman of the main committee. The other members of the national committee are F. A. Scheffler and Erik V. Oberg.

The action of President Main is in accordance with the action by the council at its meeting in Worcester of carrying out the recommendations of the Committee on Readjustment of Industries for War Work, and the president chooses the above method as the best means of rendering effective service by offering our organization to an agency already established for carrying on the work.

The Coal Situation

The Fuel Administrator has issued statements to show the situation which confronts us in the matter of fuel, and it is well to thoroughly understand just what it means. Summed up it is this:

We require 80,000,000 tons of coal more than we produced last year.

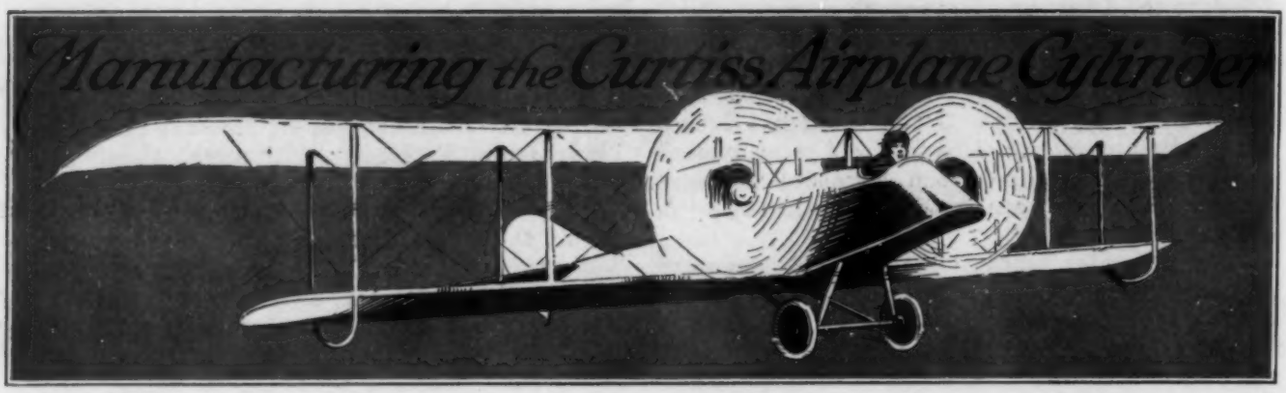
Increased production can hardly take care of more than half of this amount; so far it is only 10,000,000 more than last year.

Nearly 100,000,000 tons are used by industries not on war work. Much of this must be cut down by economies and prevention of waste or the industries must be closed.

The only answer is to save coal at home and in industrial plants. It is believed that from 50,000,000 to 75,000,000 tons can be saved in this way, but we must all do our share. We must sift ashes, refrain from overheating houses and reduce demands for light and power.

Every ton of coal saved will keep 50 workmen from idleness and permit the creation of several hundred dollars' worth of industrial wealth.

Fuel economy is being given intensive study in connection with steam plants and industrial uses. An organization is already in existence provided with engineers and inspectors who will visit every one of the 250,000 steam-producing plants in the country with a view to the improvement both of equipment and firing practice. This is expected to save 20,000,000 tons of coal. The economical use of power in factories will be in the hands of organized shop committees. The power loads of the public utilities throughout the country are being studied with a view to readjustments which will result in large saving.



By G. D. RANGER
Factory Manager Standard Gauge Steel Co.

II. The Water Jacket

In the following article the cylinder is subjected to a number of operations to prepare it for the reception of the Monel-metal water jacket. The various operations on the sheet-metal jacket are also covered, together with several of the brazing operations. These brazing operations require the greatest care and skill. Copper alone, with a flux, is used as the cementing medium, no soft solder or any other patching being allowed.

THE next operation on the cylinder is shown in Fig. 17. This consists of spotting the ribs or, in other words, turning the outside to a definite size. This is done on a 24-in. engine lathe equipped with a four-jaw chuck and rotary tail center. The same rigid toolpost is used as in the first roughing operation.

The work now goes to a boring mill, Fig. 18, where several operations are carried on by means of the tools held in the turret. The single tool shown at *B* roughs the pilot and faces the anchor flange; the double tool shown at *A* sizes the pilot. The tool shown at *C* is a single-pointed boring tool and rough bores the cylinder. At *D* is an inserted tooth reamer which finishes the bore.

The top plate is now faced off and chamfered in an engine lathe, as shown in Fig. 19, to prepare it for brazing. The cylinder *A* is gripped on an expanding arbor.

The inside of the cylinder at the top is recessed for the compression space. This operation is carried on in the engine lathe, shown in Fig. 20. The work *A* is clamped in the pot chuck *B* by the clamps *C*. Mounted on the cross-slide is a bracket *D* which carries a special counterboring tool *E*. This counterboring tool consists of a bar through the center of which passes another bar. One end of this bar connects with the lever *F;* the other bar is provided with an eccentric pin which engages a slot in the recessing tool. The construction of the tool will be more readily apparent by referring to Fig. 21. Here the body of the tool is marked *E*. The operating handle *F* and the cutter *G*, *G*1 and *G*2. It will be observed in both Figs. 20 and 21 that rollers *H* are provided to carry the sidewise thrust when the tool is in operation, Referring again to Fig. 21, the slot in the tool, which engages the pin in the central bar, is shown at *I*. The cutting edge of the recessing tool is at *I*.

The valve ports are now rough bored with the four-fluted roughing reamer *A*, Fig. 22. The work is held in an indexing jig *B* provided at the top with guide bushings for the reamer. This operation is carried on in a vertical drilling machine.

The ribs of the cylinder are rough turned, as shown in Fig. 23. The work *A* is gripped on the expanding arbor *B*, while the head end of the cylinder is supported

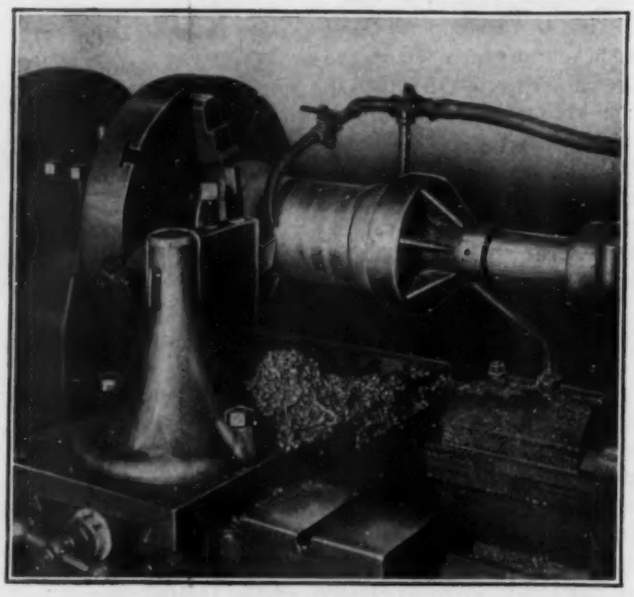
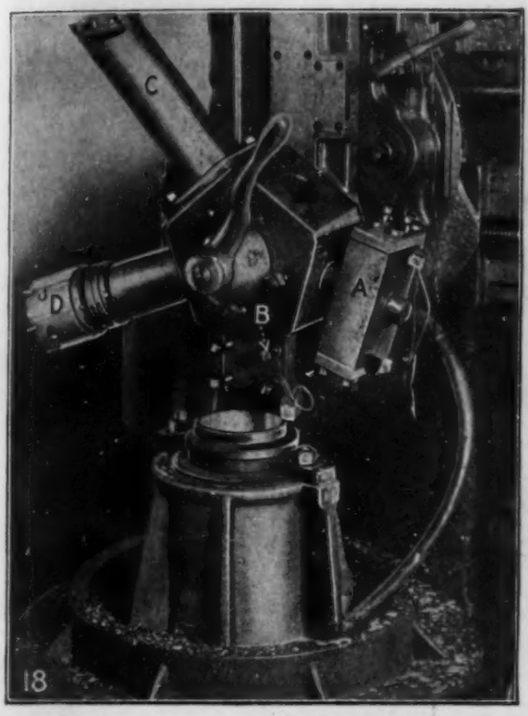
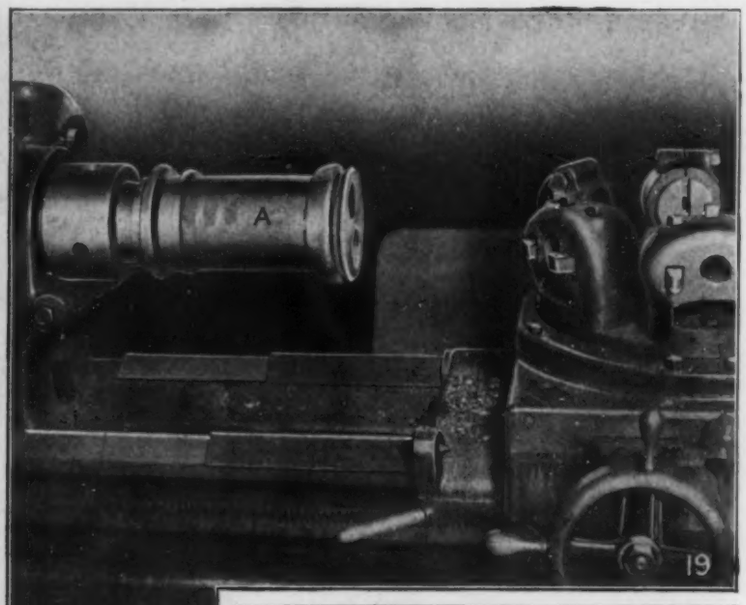


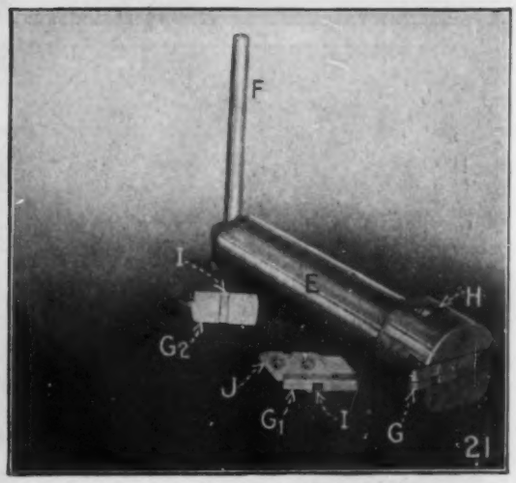
FIG. 17. SPOTTING THE RIBS

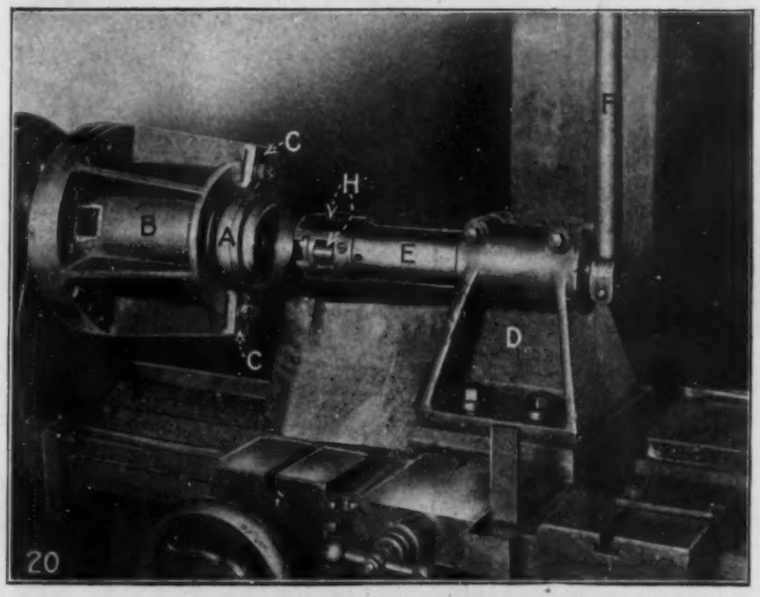
on the revolving tail center *C*. A multiple toolpost *D* carries four tools. The roughing operation is immediately followed by the finishing operation, which is carried on in a similar lathe, as shown in Fig. 24. The methods of holding the work and the tools are similar. There is, however, an addition in the shape of a forming tool to finish the part *E*, which occupies a position on the exterior of the cylinder in line with the recess in the inside. This forming tool is operated by the crank handle *F*, as it is obviously necessary to withdraw this tool when the longitudinal feed is used for turning the depressions between the ribs.

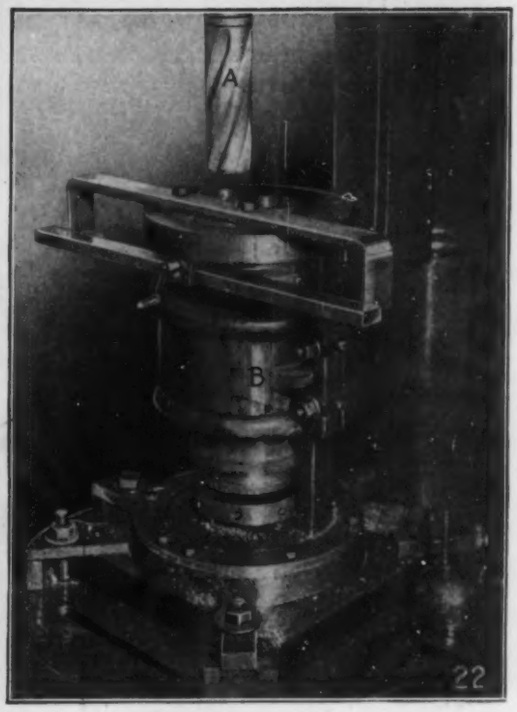
The anchor flange, where the cylinder is bolted to the crankcase of the airplane engine, is milled in gear-cutting machines, as shown in Fig. 25. The cylinder is placed over the expending arbor *A*. An extension *B* provided with two lugs *C* locates the cylinder correctly

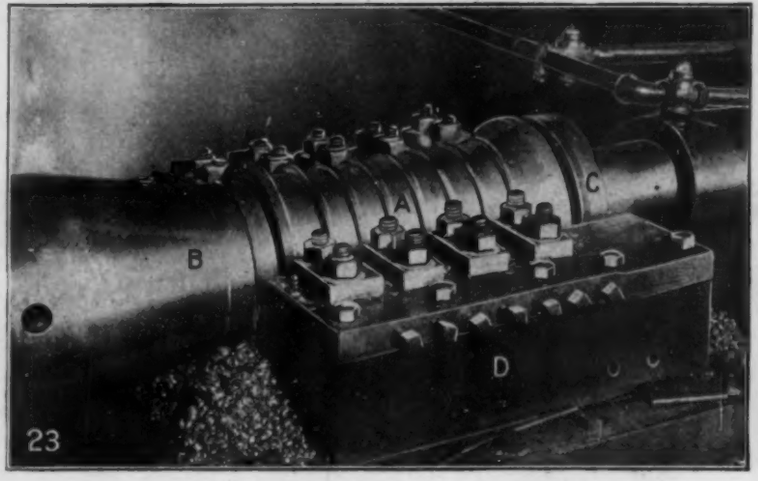












FIGS. 18 TO 23. TURNING, FACING, BORING AND DRILLING OPERATIONS

Fig. 18—Rough turning pilot, facing anchor flange and rough boring. Fig. 19—Facing off and chamfering top plate. Fig. 20—Rough counterboring. Fig. 21—Recessing tool. Fig. 22—Rough boring valve ports. Fig. 23—Rough turning ribs

FIGS. 26 TO 31. MAKING LAP JOINTS, DRILLING AND BRAZING

Fig. 26—Making lap joint in water jacket. Fig. 27—Drilling screw holes. Fig. 28—Tacking jacket to top plate. Fig. 29—Brazing the seam. Fig. 30—Brazing the outlet nipple. Fig. 31—Brazing top plate to jacket

with relation to the valve openings. To the right in Fig. 25 at *D* can be seen one of the cylinders in operating position.

The cylinder is now ready for the reception of the water jacket. This jacket is made of Monel metal about $\frac{1}{32}$ in. thick. These jackets are rolled up to the form shown in Fig. 26. They are then placed in the crimping fixture *A*, and by means of proper swages a lap point about $\frac{1}{8}$ in. wide is formed. The jacket is then clamped on the outside of the cylinder, as shown in Fig. 27. In this illustration *A* is the cylinder, *B* the jacket, *C* two

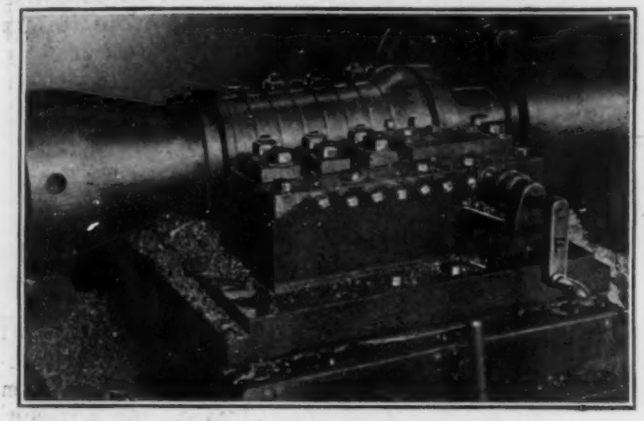


FIG. 24. FINISH TURNING THE RIBS

simple strap clamps and *D* a wooden V-block. The work in the V-block is then placed on the drilling-machine table and the outer member of the lap joint drilled at previously located points for the reception of machine screws. The point of the drill marks the inner member of the lap joint. The work is now removed from the cylinder, placed on a wooden stake, and with a punch of the proper size the operator punches the holes in the inner member of the lap joint at the positions marked

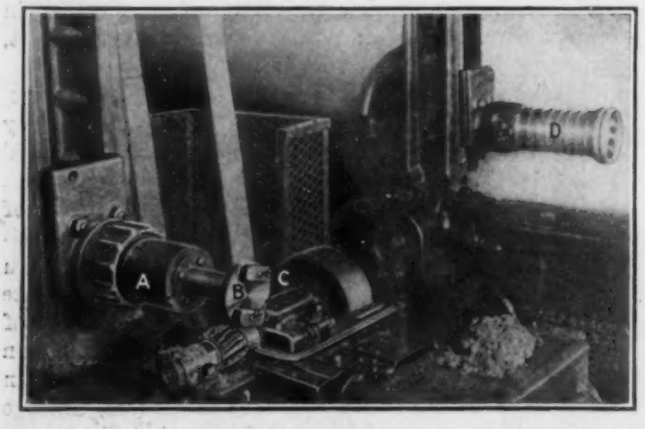


FIG. 25. MILLING THE ANCHOR FLANGE

by the drill point in the previous operation. As the work is punched on the wooden stake, a vertical flange is thrown up inwardly; this provides sufficient metal for tapping for the screws which are used to hold the jacket in place while it is being brazed.

The jacket is now fitted in place, the screws are inserted, and it is taken to the brazing department, where the first operation is "tacking" in place. The brazer in this operation brazes two points *C*, where the jacket *A* comes in contact with the plate *B*, Fig. 28.

The lap joint is next brazed, as shown in Fig. 29. This operation is performed with an ordinary gas torch, copper wire and borax.

The water inlet and outlets are next brazed in place, as shown in Fig. 30. The jig *A* on its inside is provided with two lugs that enter the valve openings in the top of the cylinder. The fork at *B* locates the outlet nipple *C*. A similar jig is used for locating the inlet nipple during the brazing operation.

The top of the water jacket is next brazed, as shown in Fig. 31. Here the work is placed inside the sheet-iron cylinder *A* and the joint between the jacket and cylinder thoroughly brazed with copper.

Dealing With the Ordnance Department

BY PAUL ALLEN MACKENZIE

I believe that an answer to the article by "Well-Known Manufacturer" on page 903, Vol. 48, commenting on a previous article, "How to Deal With the Ordnance Department" (page 545, Vol. 48), is important, as the subject is of great interest at present, particularly to small manufacturers.

"Well-Known Manufacturer," who I believe would have signed his name had he sufficient confidence in his assertions, takes exception to the statement, "There should be no difficulty in securing information as to what can be done for the Ordnance Department if the contractor is sufficiently familiar with conditions." However, it was a logical statement. The first thing that anyone coming to Washington should do is to acquaint himself with the method necessary to reach the proper departmental organization with which he has to deal. Manufacturers come to the office asking what section they can do work for, and when they are asked what they want to figure on they say, "I do not know," "I don't know what I can do." How then is any officer going to advise such a man to what department to go?

I have been a contractor myself, and certainly if I were coming to Washington to secure work from the Government I would have a list of my available machinery, the number of my employees, the location of my factory and the nature of my regular product to submit when I reached the Ordnance or Quartermaster Department. I would, as would any salesman, try to make it as easy as possible for myself to secure Government business.

This many manufacturers do not do. The ordnance officers are specialists in their lines, but these lines do not include mind reading or clairvoyancy. They may be as good guessers as most people, but when one comes into their office and says, "I have a factory," or "I have a machine shop and I want to make something," they cannot immediately tell what he is best capable of making.

There is in the Ordnance Building at Sixth and B Sts. an information bureau as finely organized as may be found anywhere. The names of every officer in the Procurement and Production divisions, classified according to the work that they are connected with, is directly inside of the entrance to the building, together with the telephone number and room number of the officer.

It is not believable that any manufacturer of textile machinery or metal stampings who is interested in

obtaining a Government contract would come to Washington so ignorant of the basic requirements of the Government as not to know what section it would be most reasonable for him to expect to get work from. If he will then call the chief officer of that section by telephone he can always see him or one of his assistants, or failing in this, by going to the Plant Facilities Section, he will there quickly be told what work his shop or factory is best fitted for and be directed to the officer in charge of the section handling that class of work.

As "Well-Known Manufacturer" says, "Why should a manufacturer have to go to Washington and spend time and money going around trying to find information which nobody seems able to give him?" With the help that the Government gives him he can very quickly find out what he can do without spending money. Any man with a well-organized shop or factory behind him can cover every section, if necessary, of the Procurement Division of the Ordnance Department in one day and will at the end of that time know conclusively just what he can do. No salesman in any city in the world could cover as great a field of opportunity in so short a time.

"Well-Known Manufacturer" also asks "Why should not the Ordnance Department have a bureau of information in every large industrial center?" As has been widely advertised through the newspapers the Ordnance Department and the Bureau of Public Information have a branch office in every important manufacturing center in the country, and although these offices are in no sense information bureaus, being distinctly production offices for the purpose of speeding up the production of Government material, anyone stopping at one of them to secure information about the availability of his plant for Government work will receive courteous treatment and an answer to his questions.

"Well-Known Manufacturer's" statement that he has asked officers what he could do with his plant and they could not tell him might be true. He cannot expect every officer in the Ordnance Department to know every branch of ordnance work. These men, it must be repeated, are specialists, and it is quite possible that a steel man would not know what a textile factory could do or vice versa. Why doesn't "Well-Known Manufacturer" go to the Plant Facilities Section and find out about the production?

About Idle Capacity

He further states that if the productive capacity of the country is so great that it is not necessary to call all manufacturers into service why is it that so many special works are being constructed instead of using the organized ability of smaller factories and their idle capacity? I have traveled extensively throughout the United States during the last 18 months and I have not noticed much idle capacity.

Finally "Well-Known Manufacturer" makes the statement that brokers do secure Government contracts and endeavors to prove his point by giving an illustration. Exceptions often prove the rule. It would be useless to deny the fact that brokers have secured contracts, and it is also true that purchasing officers refuse to work with known brokers, and as most reputable manufacturers can afford to send a genuine representative to the Government it is quite safe to say that in many cases contracts are handled in this way.

"Well-Known Manufacturer" contends that as big firms continually have men in the field they naturally learn of proposed contracts ahead of time and are on the ground ahead of the small manufacturer who has no Washington representative. This is unfortunately true, but it is absurd for him to take the attitude that America is fighting this battle for the benefit of the manufacturers. The Government's first and most important duty is to secure the arms and munition that are necessary to protect our homes, and as long as it can do this consistently and at the same time protect the manufacturer it will of course do so; but if the manufacturer is not in the field to take care of his own interest he should not expect the Government, which is treating him with as much courtesy and consideration as possible at this critical time, to do so.

War Committee, Technical Societies of Chicago

In an effort to coöperate for war work, a joint war committee has been formed by representatives of technical societies centered in Chicago. The movement was started by the Military Committee of the Western Society of Engineers, and several meetings have been held at the Engineers' Club, Chicago. As a result, the War Committee, Technical Societies of Chicago, to quote the official name, was organized June 4, 1918.

The purpose of the organization is "to enable the technical societies of the Chicago zone to call into play the efforts of the members of the various societies herein represented, as occasion may arise, and to coördinate their activities in the most effectual manner to help win the war." The combined strength and resources of the Chicago technical societies will be placed at the disposal of the United States Government and other authorized agencies.

The following member societies are coöperating in the new war committee: Western Society of Engineers, Structural Engineers' Association of Illinois, Society of Industrial Engineers, Illinois Society of Engineers, Illinois Society of Architects, the American Railway Engineering Association and the Swedish Engineers' Society of Chicago; Illinois Chapter American Institute of Architects, Chicago Section American Society of Mechanical Engineers, Chicago Section American Institute of Electrical Engineers, Chicago Section American Chemical Society, Chicago Section American Institute of Mining Engineers, Mid-West Section Society of Automotive Engineers, Illinois Association of American Society of Civil Engineers, Chicago Section American Society of Heating and Ventilating Engineers, Chicago Section American Society of Refrigerating Engineers, Chicago Section, Steel Treating Research Society, Chicago Section Illuminating Engineering Society and Chicago Chapter American Association of Engineers. Officers elected are as follows: Chairman, F. K. Copeland; vice chairman, W. L. Abbott; secretary, Edgar S. Nethercut, and treasurer, William A. Fox. The executive committee consists of F. K. Copeland, W. L. Abbott, William Hoskins, C. A. Keller, Charles E. Lord, C. F. Loweth, Isham Randolph and Richard E. Schmidt. The address of the secretary is 1735 Monadnock Block, Chicago.

The Champion Chipper

THIS young fellow working on the steamship *Tuckahoe*, which was recently built in 27 days at the yards of the New York Shipbuilding Corporation, Camden, N. J., broke all previous records for chipping. If you could see his face you would note some of the determination one sees in the faces of those who go "over the top." We can't all go "over the top" of a trench, but in our work we can "over top" what we have done in the past. This boy has speed and endurance beyond the average, but these alone would not have pulled down the record. He stuck to his job for every minute of his working time during the 27 days it took to build the *Tuckahoe*. Directly or indirectly war is now the business of every red-blooded man in the United States. Our work is just as essential to the well-being of our boys at the front as is the work of this record maker.

Are we giving our best?

The Lyons Fair

SPECIAL CORRESPONDENCE

Though distracted by four years of war France has been able to hold her famous annual industrial exposition known as the Lyons Fair. Naturally there were many restrictions that interfered with the exhibition, but it was nevertheless a great success. For the first time in the history of the fair an American publishing firm was represented, the McGraw-Hill Co., Inc., having a stand for all of its publications. American machine-tool manufacturers were well represented.

Lyons, France, Mar. 15 (Delayed in Transit)—So far as matters of engineering are concerned the third Lyons Fair, which opened Mar. 1 and continued until Mar. 15, reflected clearly the participation of France and her allies in the war. From the point of view of technical men it was largely a machine-tool exhibit. This year, as formerly, the fair covered a wide range of industries—practically everything from the making of silk and laces to the manufacture of huge artillery field pieces, shells and aerial bombs. For the first time in its history a publisher of American engineering journals was an exhibitor at the fair, the McGraw-Hill Co. Inc., of New York, publisher of the *American Machinist* and nine other technical papers, having a stand in the Place Bellecour group at Lyons.

When one considers the difficulties that come with almost four years of war—difficulties of transportation, scarcity of materials, shortage of man power and restrictions of imports and exports—France gave no uncertain demonstration of her industrial vitality.

The United States, which handled so large a volume of business at the preceding fair, participated again this year, but it was even more difficult this year to ship samples to the fair than in 1917, and sales have been largely through the medium of catalogs under the direction of Dr. Lyons, United States Consul at Lyons, who is responsible for this scheme of representation.

The effects of the crippled transportation facilities in France made themselves felt at the fair, for on the opening day very few of the stands were equipped. This applied particularly to the stands of foreign exhibitors. The McGraw-Hill Co., for example, had shipped a case of its journals from New York. The case arrived at Bordeaux, but was held there and was not delivered until the last day of the fair.

Conditions affecting the participation of American industries in trade with France and other countries formed the subject of a statement issued during the period of the fair by C. W. A. Veditz, commercial attaché of the American Embassy at Paris, from which the following are excerpts:

"When considering the question of Franco-American commerce it is evidently necessary to take into account normal, or prewar, conditions as well as actual, or war, conditions. The extraordinary increase in American exports to France during the war is to be attributed to an abnormal state of affairs which will cease with the finish of hostilities. Nevertheless this certain change of circumstances does not necessarily mean that our commercial relations with France at the end of the war will revert to the commercial relations of prewar times. After the war many new considerations will have to be reckoned with. The governing factors of Franco-Amer-

FIG. 1. EXHIBIT OF THE ALLIED MACHINERY CO.

ican commerce after the war, while they may differ considerably from the governing factors of today, may quite as easily differ considerably from the factors which prevailed before the war. . .

"It seems almost inevitable that France shall look to the United States to assist her in procuring at least some of the new machinery necessary for the recovery of her strength and the reorganization of her resources. As in the past, France will look to us for the supply of such raw materials and partially manufactured articles as may be necessary.

"It should be borne in mind that before the war American imports into France were subjected to a régime far more onerous than were goods imported into France by other countries, Germany included. As our ambassador in France once remarked, we would have been a lucky nation and our healtfelt thanks would have been due to France had she accorded us such favorable tariffs as those which she afforded to Germany before the war (by virtue of the Frankfort Treaty). Coincident with the after-war overhaul of customs tariffs it is quite feasible to suppose that tariff commissioners will take carefully into consideration the new order of things resulting from the war and the common interests of the allied nations. . .

"The extraordinary success of the Lyons Fair in 1916 and 1917 is a striking proof of the economic vitality of France as well as the capacity for organization of its statesmen and commercial agents. While it is not for me to proffer advice to the officials in charge of the Lyons Fair I am strongly of opinion that the importance of the fair should be brought home strikingly to American importers and exporters. Also I am of opinion that such commercial organizations as the Lyons Fair would stimulate Franco-American trade to an enormous extent."

In the group "Metallurgy," which at this year's fair was housed in concrete stands, were the machine tools and the rest of the equipment used in the manufacture of munition and ordnance. Few American manufacturers had individual stands, although their products were on display at the stands of French companies acting as agents or in various other special capacities. The Allied Machinery Co. de France (Paris), however, had a four-compartment stand which contained a Warner & Swasey Co. (Cleveland) turret lathe, a Nutter & Barnes (Hinsdale, N. H.) cold saw, a Landis Machine Co. (Waynesboro, Penn.) double-chuck lathe, a De Mooy Machine Co. sensitive drill, a Boye & Emmes Machine Tool Co.

FIG. 2. EXHIBIT OF THE ALLIED MACHINERY CO.

(Cincinnati) 20-in. lathe, and several types of Cowan (Holyoke, Mass.) transveyors. Then too there were machine tools from the Chicago Machine Tool Co. and Flather & Co.

Another big exhibit was that of the Compagnie des Forges et Acieries de la Marine et d'Homecourt (St. Chaumond), which in addition to producing war materials of almost every type handles Lackawanna sheet piling in France. Machine tools and machine-tool products in almost endless number were shown by the Forges de Vulcain (Paris); Société Anonyme de Commentry; Fourchambault & Deceizeville (Paris); Descours & Cabaud (Lyon), who also exhibited rails and steel members; Chavanne-Brun Frères (St. Chaumond), laminating machines; H. Morin (Paris), gages; Acieries et Forges de Firminy (Loire); American Trading Co., which had Davis Machine Tool Co. lathes and drilling machines, Buffalo transporters, and Pawling & Harnischfeger products. The Société des Moteurs Salmson (Billancourt, Seine) was another big exhibitor, its chief product now being airplane motors and magnetos.

Forgings of many kinds were shown by Etab. Arbel, Forges de Douai and Forges de Couzon. The Detroit

Twist Drill Co. had a stand of its own, Garston E. Marbaux being the local representative.

The firm Anc. Etab. Glaezer & Pirreaud (Paris) represented a great number of United States machine-tool manufacturers at the fair, among them being the Niles-Bement-Pond Co., New York, London and Philadelphia; R. K. Le Blond Machine Tool Co., Cincinnati; Bardons & Oliver, Cleveland; Acme Machinery Co., Cleveland; Consolidated Press & Tool Co., Hastings, Mich.; Ohio Machine Tool Co., Kenton, Ohio; Springfield Machine Tool Co., Springfield, Ohio; Foote-Burt Co., Cleveland; Smith & Mills, Cincinnati; Adams Co., Dubuque, Iowa; Aurora Machine Tool Works, Aurora, Ind.; J. N. Lapointe Co., New London, Conn.; Gardner Machine Tool Co., Beloit, Wis.; Espen-Lucas Machine Works, Philadelphia; Dalton Machine Co., New York; Bilgram Machine Works, Philadelphia, and the Sipp Machine Co., Paterson, N. J. This stand also was the headquarters of the Chicago Pneumatic Tool Co.; Curtis & Co., St. Louis; American Pulley Co., Philadelphia; Standard Pressed Steel Co., Philadelphia, and Carlyle Johnson Machine Co., Manchester, Conn. Leon Chapins showed an outfit of the Universal Drafting Machine Co.

Cleveland Gage Laboratory

Attention is called to the establishment of a Cleveland branch of the gage section of the Bureau of Standards, which was opened on Monday, July 1. Its location is in the Plymouth Building 22d St. and Prospect Ave., Cleveland, Ohio. The district office of the Inspection Division, Ordnance Department, is also in this building.

The establishment of a branch gage laboratory in Cleveland is mainly for the purpose of taking care of exigency munition limit-gage tests in the Cleveland district. All gages ordered by the War Department for test at the Bureau of Standards and delivery in Washington should be submitted directly to the Bureau of Standards in Washington, D. C.

At this branch laboratory are facilities for testing all types of munition limit gages and are available without charge to manufacturers carrying out Government contracts for munitions of war. Equipment has been installed which is practically a duplication of the various machines and special devices used at the Bureau of Standards in Washington for the test of plain plug and ring gages, profile and other forms of gages, and especially screw-thread gages.

Gages may be submitted by mail, express, or by messenger, and when shipped it is recommended that they be sent by registered or insured mail rather than by express, on account of the saving of time.

It is requested that all mail and gage shipments be specifically addressed as follows: "Bureau of Standards, Branch Gage Section, Plymouth Building, Cleveland, Ohio."

Persons submitting gages for test are requested to furnish complete information as to the identification and classification of the gages, instructions for test and shipment, and also information such as drawings and specifications, which establish the important dimensions of the gages submitted. If copies of Ordnance Office drawings or other Government gage drawings or part drawings are submitted with the gages it will greatly facilitate the test and permit the sealing of the gages.

Training of Soldier Mechanics

Few of us appreciate the work that is being done in training enlisted men in the various branches of mechanics that the army requires just as much as it needs fighting men. As a matter of fact, however, these are often one and the same man, as it is necessary for each army division to be complete within itself so far as possible and not to have to send to the rear for special mechanics to handle special problems which arise from time to time near the battle front.

An excellent example of the work being done can be found in and around Boston, where there are 500 men being trained at Wentworth Institute, 250 at Franklin Union and another 100 at Tufts College. They are divided up among gas-engine men, sheet-metal workers, automobile mechanics, carpenters, blacksmiths and gunsmiths.

These three institutions pool their equipment and their men so that when certain kinds of work must be done it is sent to the shop best equipped to handle it and having men who are being taught in that particular line. The keynote of the whole training is to have the men do actual work, such as making toolboxes for motor trucks, oil cans, automobile drip pans and tin cups for various purposes. The carpenter squad also engages in actual construction. As an example of this, the students at Tufts are building an annex to the power house, and they will erect the building themselves.

Not only is the actual trade training of the men being thoroughly looked after, but their recreation after work is also being carefully considered at the various institutions. Here again the spirit of coöperation crops out, for while Wentworth has no hall large enough to hold all its detachments, Franklin Union is well equipped in this respect, and the Wentworth detachment simply marches down to Franklin Union for the evening's entertainment.

The Committee on Education and Special Training, Room 302, Old Land Office Building, Washington, D. C., which is in charge of this work, is issuing a little publication called "The Fighting Mechanic," which contains interesting news in regard to the work the committee is doing, and occasionally it has an illustration of some of the activities of the students.

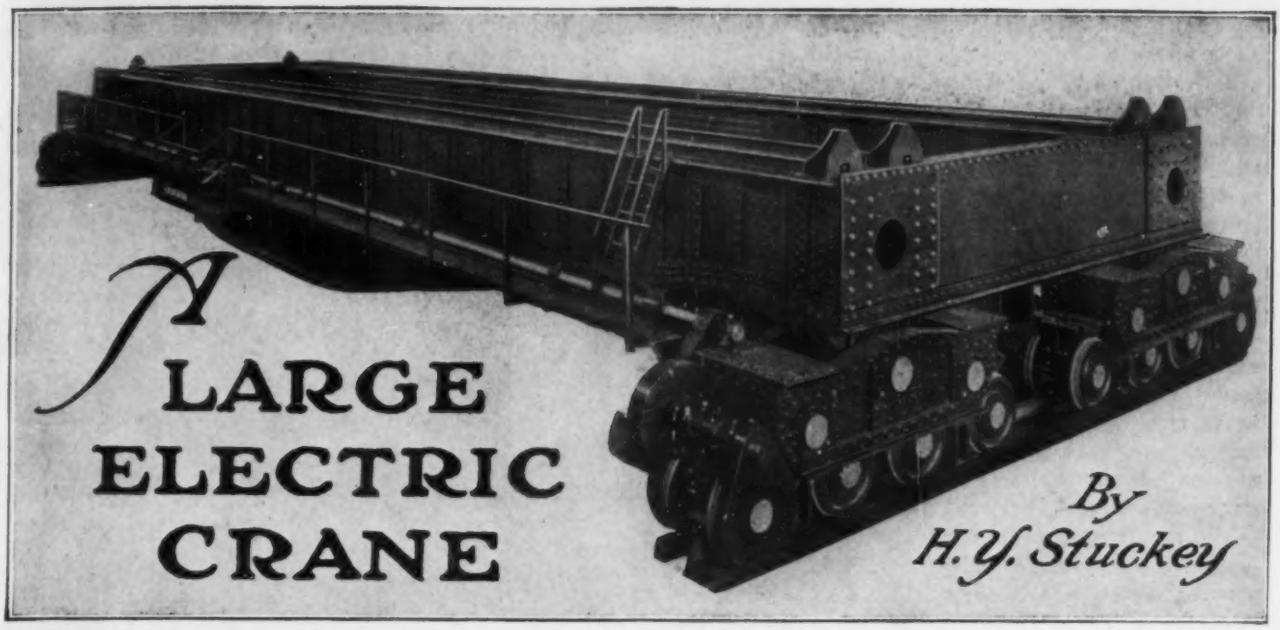
Jack Is Now a Toolmaker

BY M. F. DEEVAN

In a letter on page 611, Vol. 48, of the *American Machinist* Dixie claims to have met "Jack" or one of his friends at the So-and-So company's shop. I am convinced, however, that "Jack" or some of his relatives work for us, as witness the following:

One day the foreman noticed a "toolmaker" turning a taper without making use of the attachment with which the lathe was provided for that purpose. On being asked why he did not use the taper attachment the toolmaker replied that it was "imperfect," and to substantiate his statement he showed the foreman where it was plainly marked IN.PER FT.

On another occasion an inspector asked me if the Swedish inch was the same as the English inch, as he had a set of "Swedish" gages and wanted to know if it was safe to use them the same as U. S. Standards.



A LARGE ELECTRIC CRANE

By H. Y. Stuckey

ONE of the largest electric traveling cranes ever built was recently shipped from the shops of the Alliance Machine Co., Alliance, Ohio, and required 16 freight cars for its transportation. Notwithstanding its huge size and the many unusual problems which were involved in its design and construction, because of the immensity of the loads to be handled, the wide variations in hoisting and lowering speeds and the necessity for extreme accuracy of control, the crane was completed in a period of approximately nine months.

The total lifting capacity of the crane is 431 net tons, of which a weight of 336 tons is handled by the main hoist, 90 tons by the first auxiliary hoist and 5 tons by the second.

When installed this crane will occupy a position above two similar cranes of 300 tons capacity each, these latter being now under construction at the Alliance plant.

The main hoist is designed to secure accurate control, and for this reason the main trolley, Fig. 1, carries two drums driven by two trains of gearing acting

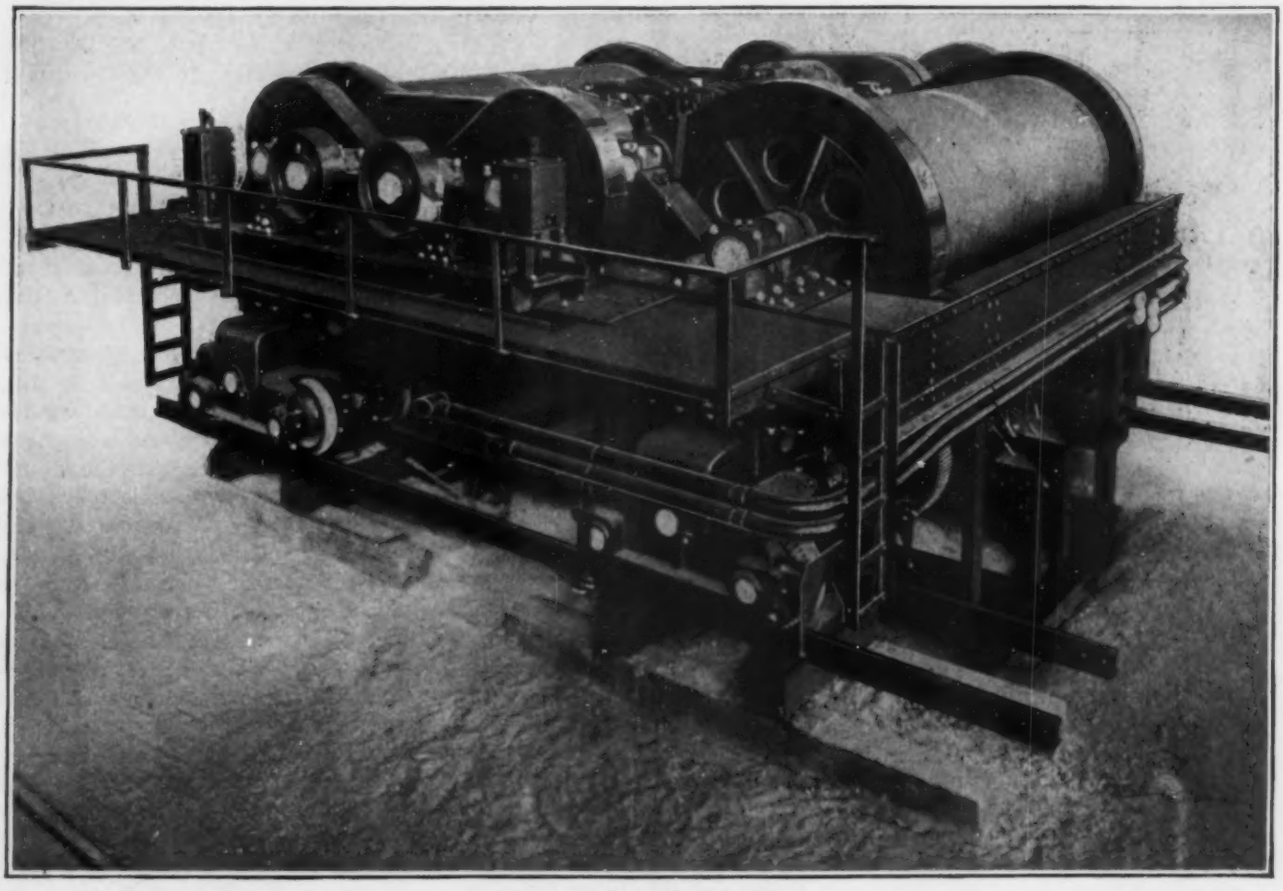


FIG. 1. THE MAIN TROLLEY

together, thus eliminating the possibility of a swinging movement being imparted to the load.

Both dynamic and jackshaft braking are employed in the special braking apparatus, which is so designed and arranged as to allow the operator to lower the load ¼ in. at a time. The hoisting and lowering speed under full load is 12½ ft. per minute. The main hoist is operated by two 200-hp. motors, insuring unusual safety of operation, as in case of emergency one motor can for a short time handle the full load alone. The two motors are coupled together to avoid any variation of speed.

The auxiliary trolley, Fig. 2, which is entirely independent of the main trolley, is of special design to meet the specifications in regard to speeds of the two separate hoists which are carried upon it; these speeds vary from 2 to 45 ft. per minute and are controlled by a special magnetic clutch and reduction gearing, which is, of course, very necessary.

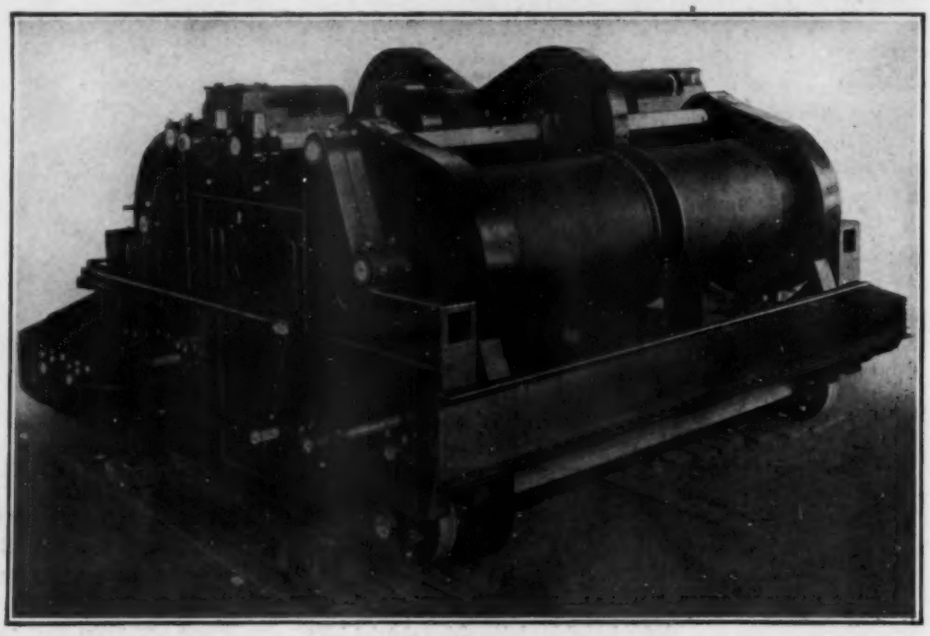


FIG. 2. THE AUXILIARY TROLLEY

The crane runway is 120 ft. above the ground level, and the maximum lift is 100 ft. The span of the bridge is 90 ft. 4 in., and that of the trolleys 18 ft. The main trolley carries an 80-hp. motor for the traverse, while a 30-hp. motor serves the same purpose for the auxiliary, the speed of the traverse being about 45 ft. per minute.

FIG. 3. MAIN HOIST HOOK

The bridge, an illustration of which appears at the head of this article, is carried by 32 wheels, 30 in. in diameter, running upon a double runway. Two 50-hp. motors acting independently supply the motive power, which is transmitted through one pair of wheels at each corner of the bridge, or eight wheels in all.

The trolley and bridge trucks are designed to oscillate in all directions to compensate for any deflection caused by the load.

The main hoist-hook block is shown in Fig. 3. The height from the bottom of the hook to the top of the block is 12 feet.

Development and Production of Airplanes

While the first consideration at present is the production of more and more guns, shells, airplanes and other materials of warfare, the development of better and newer devices in every line ought not to be overlooked. As in any manufacturing business that is at all successful, it is absolutely necessary to keep production and development entirely separate, otherwise production is sure to suffer. This has been one of the great difficulties in the airplane program—the desire for newer and better machines—which, while very laudable in itself, has seriously hindered production of the machines which we so badly need.

It is also unfortunately true that the experience of some of the best builders of airplanes in this country has been ignored, and to all appearances no ideas seem to be wanted unless they came through certain channels. To be more specific the Curtiss triplane, which is pronounced by experienced fliers to be one of the best all-round machines made and one that can be very easily handled even by pilots of comparatively little experience, does not seem to have received any consideration whatever, in spite of the fact that the Sopwith triplane is being extensively used by the British fliers. In the same way some of the other progressive

builders have designed machines that have more or less merit and that are most certainly much to be preferred to having no machines at all.

There is, of course, more or less research and development going on all the time, but for the most part they are confined to the ideas of a comparatively few men, some of whom unfortunately are little more than theorists and with almost no practical knowledge of aeronautics. This can be verified by a perusal of some of the specifications that have been issued for airplane instruments and for the material to be used in airplane construction.

One Way to Secure New Ideas

In order to secure the coöperation of the most experienced men in this country in developing newer and better types of machines we would suggest that every builder of airplanes in this country who has any sort of a reputation be given a positive order for three machines embodying his idea of a machine for military use. These orders should be given with the distinct understanding that the building of these machines is not to interfere with the production of standard machines which are being built for the United States Government or its allies. This would secure, perhaps, a hundred machines which could be utilized in some way and which would be sure to contain ideas which might be used in improving the airplanes we adopt.

We apreciate fully the advantages of standardization and believe in it to the extent of preferring a large number of machines of slightly less efficiency to a comparatively small number which might approach the 100 per cent. mark. But we also realize that all the brains of the country are not and cannot be confined to any research council or board of development engineers, and we believe that the money which would be spent in this way would prove an extremely profitable investment.

There is nothing new or startling in such a proposition. It is in accordance with the policy which has been pursued by many foreign governments, and is undoubtedly one of the reasons why the United States, which is the originator of the practical airplane, is so far behind Europe. It has long been the policy of foreign governments to order several machines or instruments and to test them out in a thoroughly practical manner. They have in many cases even advanced the necessary funds for the building of the machines ordered. Our policy on the other hand has been that the inventor of a new machine must present a complete and perfect machine to the army for test, and if it finally met all the requirements there was a possibility, and only a possibility, of an order being placed. This has been the experience of many inventors and manufacturers, many of them not having sufficient means to build a machine as it should be built, with the result that they have failed in the tests when they might have succeeded had they been thoroughly and properly built according to the plan mentioned.

The only departure from this program with which we are familiar was the advancing of royalties for the development of the Browning gun. The results in this case appear to have been so satisfactory that it is to be hoped a similar method may be used judiciously in other cases. But while this has been the army policy we must not overlook the fact that it has probably been due, at least in part, to the great difficulty of securing sufficient appropriations from Congress for work of this kind to be done.

It is, of course, possible that Congress could have been shown the necessity for this and a few practical examples might have been brought out to prove what could be accomplished in this way. We must not forget, however, that we, as a people, have been so imbued with the idea of peace that almost all expenditures for war purposes were opposed in almost every quarter. But now that we have seen the light let us make up for lost time, so far as is humanly possible, and secure the very best ideas, worked out in practical form.

We are continually talking about this war being an engineers' war, and it is, but we are unfortunately not utilizing the engineering ability of this country to anywhere near its proper proportions. We must see clearly that the engineer and the production manager are the only men who can secure maximum production and to whom all engineering problems must be intrusted. We have the highest respect for the military arm in the field for which it has been trained. But as each and every one of us must do the things for which we are best fitted in order to secure the greatest efficiency, it has become absolutely necessary to find the men best fitted for each particular job and enlist them in that work for the duration of the war.

Definitions of Compressed-Air Terms

On the recommendation of its technical committee the Compressed Air Society, Room 439, 30 Church St., New York, has adopted the following definitions of certain compressed-air terms in order to eliminate confusion as to their exact meaning:

Displacement—The displacement of an air compressor is the volume displaced by the net area of the compressor piston.

Capacity—The capacity should be expressed in cubic feet per minute, and is the actual amount of air compressed and delivered, expressed in free air at intake temperature and at the pressure of dry air at the suction.

Volumetric Efficiency—Volumetric efficiency is the ratio of the capacity to the displacement of the compressors, all as defined above.

Compression Efficiency—Compression efficiency is the ratio of the work required to compress isothermally all the air delivered by an air compressor to the work actually done within the compressor cylinder as shown by indicator cards, and may be expressed as the product of the volumetric efficiency, the intake pressure and the hyperbolic logarithm of the ratio of compression, all divided by the indicated mean effective pressure within the air cylinder or cylinders.

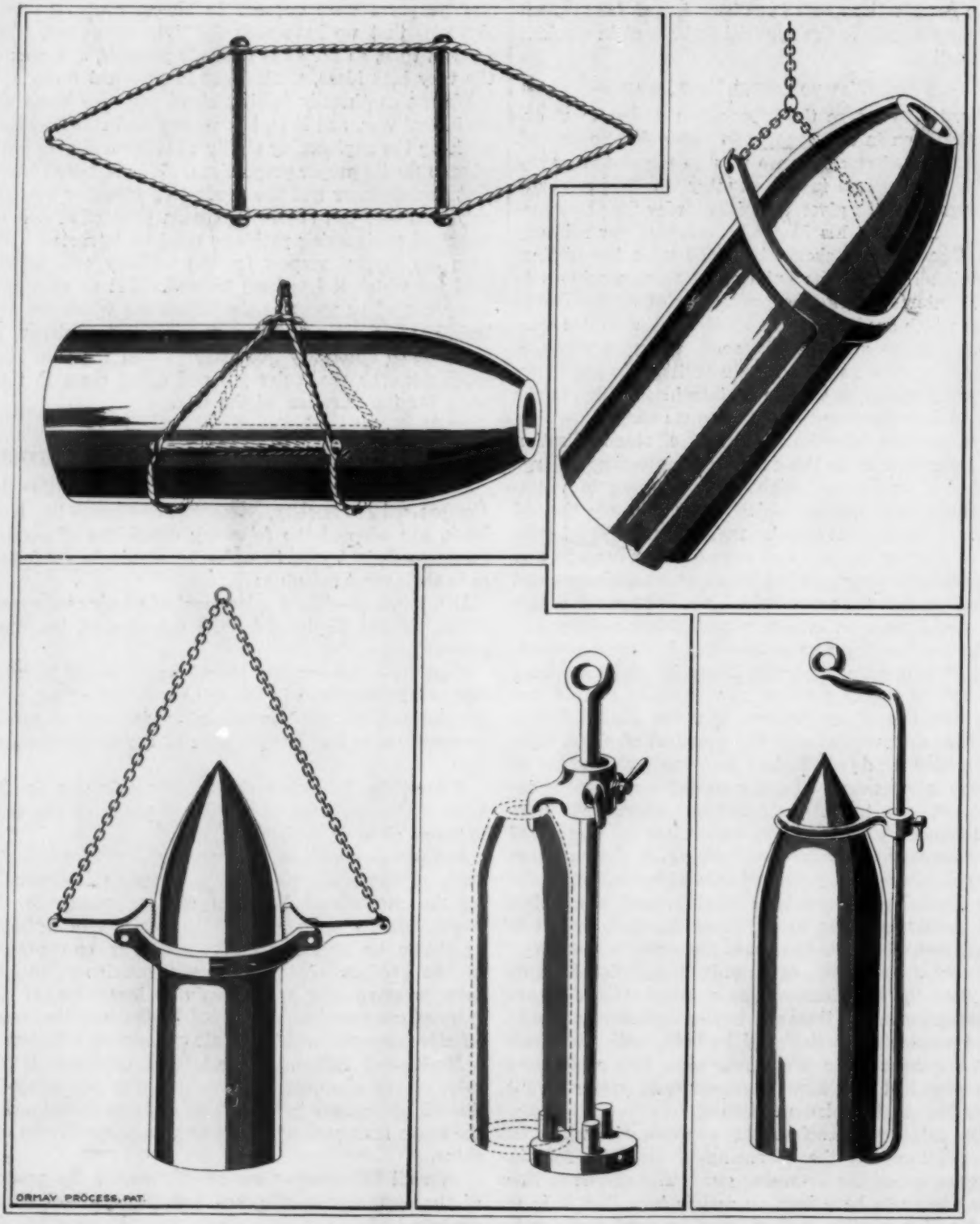
Mechanical Efficiency—Mechanical efficiency is the ratio of the air-indicated horsepower to the steam-indicated horsepower in the case of a steam-driven and to the brake horsepower in the case of a power-driven machine.

Over-all Efficiency—Over-all efficiency is the product of the compression efficiency and the mechanical efficiency.

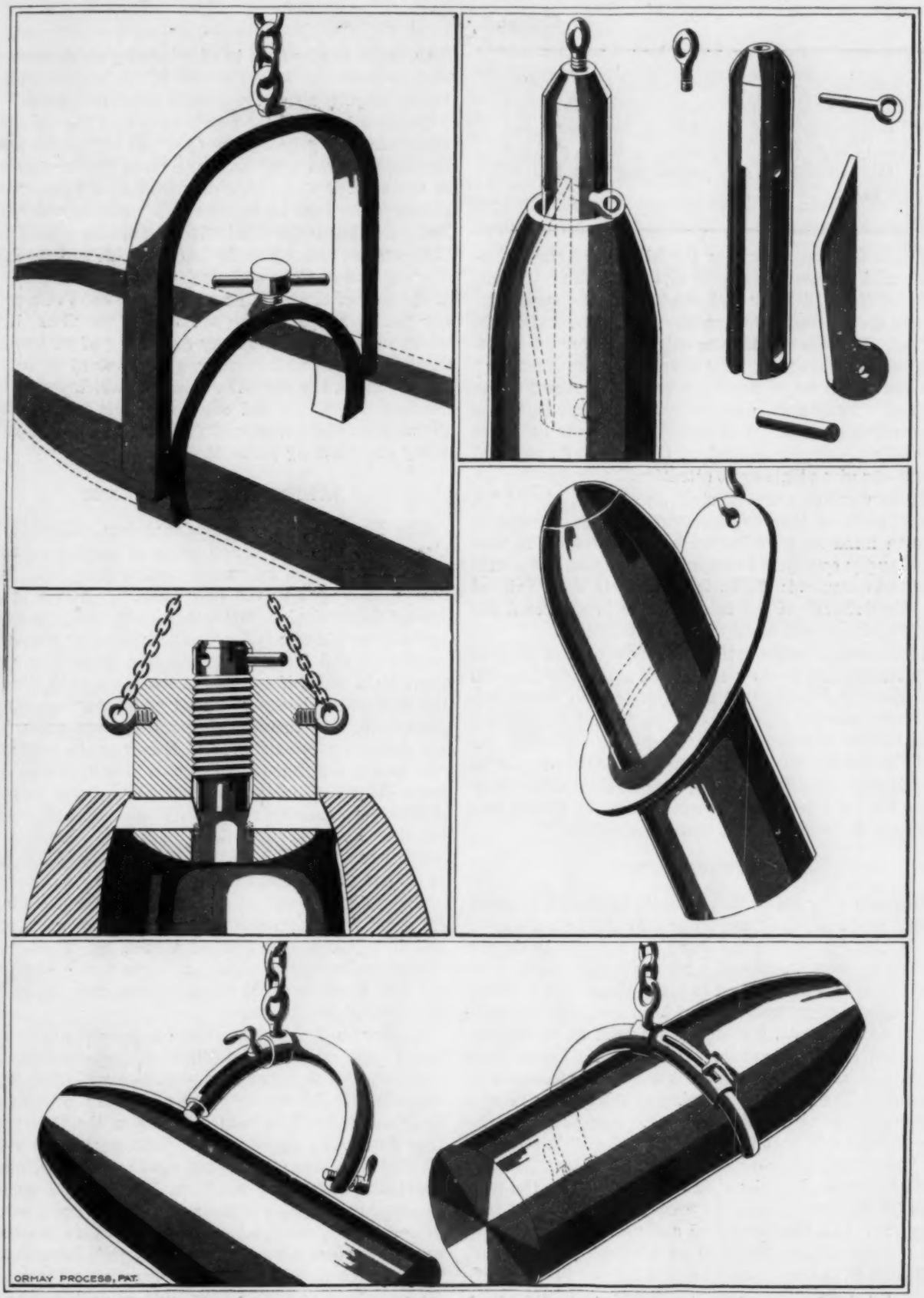
The society further recommends that the use of other expressions of efficiency be discontinued.

From a Small-Shop Notebook

By J. A. Lucas.



VARIOUS SHELL-HANDLING DEVICES



VARIOUS SHELL-HANDLING DEVICES

The Laws Guarding Machinery

BY CHESLA C. SHERLOCK

Practically all of the various states have enacted laws in which employers are required to guard all machinery. The attention of the courts has been called to these statutes many times, and out of their decisions has grown the real law in such cases.

THERE was a time in the history of our industrialism when employers of labor took no thought of the well-being and safety of their employees. It was a day and age when the sweatshop was in its heyday. But this was not the only reason for the enactment of these statutes. The development of machinery and the eagerness of capital to profit therefrom led to the use of many appliances and machines that had come from the factory or the inventor's mind only half perfected; at least the element of the operator's personal safety was given little or no attention.

These statutes were enacted, as all laws should be, "in a spirit of true helpfulness." If this thought is kept in mind an examination of the decisions handed down by the courts will convince anyone that the courts have first inquired: "Who is most likely to be injured by this defect?" Once this question is answered the decisions have been in favor of that person.

If a careful examination is made of the various statutes relating to the guarding of machinery one will find again and again that employers are to guard machinery "of every description." Just what is the legal meaning of the expression "machinery of every description" must be known before the statutes may be intelligently considered. For instance, the question may come up, "Is a crowbar to be considered as falling into the class of 'machinery of every description?'"

Liability for Defects

One authority states that it would be absurd to argue such a proposition, although one court held an employer liable under a statute making the employer liable for defects in ways, works and machinery. The courts have considered this proposition so many times that it seems that nearly every machine has been specifically passed upon. At any rate, machinery has been so extensively classified that the average person can no longer have any doubt as to whether or not a certain piece of machinery falls within the meaning of the statute requiring employers to guard machinery. Among others the courts have said that the following fall within the class of "machinery of every description": A drop hammer used to break scrap iron into smaller pieces, the purpose of the guard being to prevent pieces of the iron from flying; a friction wheel and "rattlers" turned by it; a revolving fan placed in an inconspicuous position, although it was not usual to guard fans of that description; a conveyor in a cement factory, consisting of a long, cylindrical, rotating rod, with flanges attached; a crane used to hoist molten metal, although portable and capable of being used outside of the employer's shop, and a jointer used to edge boards, which consisted of two revolving knives about 16 in. wide, and projecting slightly above the surface of an iron table.

On the other hand the courts have said that an emery wheel used for grinding does not fall within the aforementioned class. They have also made similar decisions in the case of a machine described as a "liner," consisting of an iron frame on which rested a heavy, hollow, revolving roller filled with steam and heated to a high temperature, upon the top of which and revolving thereon was another and smaller solid-iron roller; nor in the case of the rapidly revolving cylinders of a printing press; nor a square opening in the floor, below which was certain machinery consisting of an arrangement of rollers and knives which revolved at a high rate of speed, the purpose and use of which was to mix sawdust, damp clay and other materials to the proper proportions and consistency for molding into shape for tiling and building material.

Interpretation of the Court

The New York Supreme Court has said that the statute requires only those parts of machinery to be guarded which in reasonable anticipation may be a source of danger to the operatives. It would appear from this conclusion, more than ever, that the courts try to ascertain who is liable to be injured by unguarded machinery and then act accordingly. From this statement it is self-evident that there is no obligation on the part of employers to guard machinery or parts of machinery, even though they be dangerous, unless they are liable to prove a source of danger to the employees. The courts, following this thought, have said that there is no obligation on the part of the employer to guard shafting or setscrews which were 14 or more feet above the floor and reached only by a ladder. Likewise, in another case, it was held that the statute did not apply to shafting 8 ft. from the floor.

The failure of an employer to provide a chute, or conveyor, for the purpose of carrying away waste material from the second floor of a building, which might otherwise be thrown down and injure a workman on the first floor, was held in an Indiana case not to be a violation of the statute.

Employers have quite commonly contended, when called into court, that by following trade customs in a certain particular they have complied with the statute requiring machinery to be guarded. In other words their contention has been based upon the theory that they have not violated the law because they have done all that "the other fellow has done." The Washington court said in so many words that mill owners, in order to comply with the statute requiring the safeguarding of machinery, must adopt such guards as reasonable prudence, observation and care suggest, regardless of the question whether other mill owners use them. The Minnesota court held without discussion that the fact that a lath-bolting machine was not customarily guarded did not excuse an employer from failure to comply with a statute which required such machinery to be guarded.

While these decisions seem to be well considered the majority of cases reported seem to incline to the belief that a master has discharged his statutory duty when he has complied with the trade custom, or usage, among other men in the same business. In explanation it might be said that trade custom, or usage, has always found an important place in the estimation of the law. Where there has been any doubt on a given proposition the courts have tried to ascertain the trade usage and then render judgment accordingly. In fact custom is one of the sources of the law.

In a federal case an employer was held not to be guilty of negligence simply because he failed to guard a saw in his mill, where it was not shown that a guard for such saws was generally adopted by other employers in the same business. The court said that the employer was bound to exercise ordinary care and that, as to safeguards upon dangerous machinery, the test of negligence was "the ordinary and prudent usage of the business"—that is, what safeguards were "commonly adopted by those in like business." The court added: "Unless it was shown that some such safeguard is usually and customarily employed by those engaged in similar business and under like circumstances there was no proof of failure of duty by the master in omitting to employ it.'

In another case the court said: "The testimony shows that such an attachment is not in general use, and there is no general agreement among mill owners or practical sawyers that it is a desirable or useful attachment. It is not enough that some people regard it as a valuable safeguard. The test is general use. Tried by this test the saw of the defendant is such a one as the company had a right to use because it is such as is commonly used by mill owners, and it was error to leave to the jury any question of negligence based upon the failure to provide a spreader."

A Vermont Case

The courts, however, do not permit employers to take advantage of trade usages in order to escape liability in cases where they are justly liable to the employee. In a Vermont case the court said that if the employer relied upon a trade usage to show that he had not guarded his machinery because of it, he must also show that the machinery in other mills or factories were used in the same manner as his own. In the given case the employer claimed that he did not guard the emery wheels in his mill because they were not guarded in other mills by other employers. It was, however, shown that the emery wheel in question burst when it was traveling at a rate of speed greater than it should. The court said that before the employer could take advantage of this custom he must show that the emery wheels in other mills traveled at greater speeds than rated, or at least did so at times.

From a consideration of these cases it is fair to assume that an employer would be negligent if he failed to provide such guards and appliances as were commonly used by others in the same business. We find this theory supported in a Michigan case, where the court said: "An employer who uses dangerous machinery must take those precautionary measures which are usual and customary with careful, prudent men to protect his employees from all unnecessary dangers arising from the use thereof. He is to use that degree of care which every prudent man is expected to employ under similar circumstances in carrying on the same kind of business."

One authority adds this qualification, however: "Of course, the custom of the business relied upon in such cases cannot be established by testimony as to the practice of specified employers, upon the ground that the methods adopted by certain persons or the common usage of a small class of persons in a particular business should not be made a standard by which the employer's conduct in reference to the care exercised by him in providing appliances for the servant's use is to be judged."

Determinging Negligence

A few of the courts adopt the theory that trade customs are to be considered in determining an employer's negligence, but that they are by no means conclusive. The mere fact that other employers are using better and safer machinery does not make it necessary for an employer to discard his old machinery and install the new, but it is not an excuse for his refusing or neglecting to guard his old machinery properly simply because such guards are unnecessary and not used on the newer machinery. Speaking on this proposition the federal court said: "In such a case the obligation of the master to place a suitable guard around a dangerous piece of machinery is no less imperative than his duty to remedy a defect in the machine itself." And the Minnesota court held that if the machinery was in fact dangerous the duties growing out of the relation of master and servant in any particular case, as respects the use of it, were not affected by the fact that similar machinery was ordinarily left unprotected by other employers.

Likewise the Massachusetts court refused to say that the fact that it was customary to leave circular saws unguarded was conclusive to show that a saw without a guard was in a safe and proper condition for a workman inexperienced in the use of such saws. The Kentucky court has gone so far as to say that it was not the duty of the employer to furnish his employees with the machines used in other factories or by others in the same business, but that all he was required to do was to furnish the employee with reasonably safe appliances.

During the past few years, since the employment of women has become common in factories and mills, a new duty on the part of the employer has sprung up; namely, the duty to guard machinery so that the employee's hair will not be caught. It has been argued that there is no distinction in the duty of the employer to protect one's clothing against being caught in machinery and against one's hair being caught, but there is a distinction which will be apparent to all after consideration.

It is obvious that the only place where hair is liable to be caught is overhead of the operator and among machinery which it would be unnecessary to guard in order to protect clothing. Then again the duty to guard against clothing being caught would apply to everyone, while the duty to guard against the hair being caught would apply only in those occupations in which women are engaged. Here we have a clear example of the trade usage or custom. While it would be necessary to guard overhead machinery to prevent hair being caught, where women are employed, such a precaution would not be necessary in cases where men are employed.

In a New York case the court said that a master, in providing guards for shafting near which young girls are required to work, must take into consideration their age, inexperience and lack of care and discretion and adopt a shield or device that will prevent the liability of their hair coming into contact with the shaft. Some courts have said that where a manufacturer employs young girls to work near revolving shafts that there is a special duty imposed upon him to safeguard such machinery so that their hair will not be caught in it. In an Indiana case the employee was operating a sewing machine which was propelled by an unguarded shaft running under the machine. The employee dropped a shuttle and upon reaching over to pick it up, her hair was caught in the unguarded shaft and her scalp torn from her head. It was contended by the employer that the act of the employee in bending over and attempting to pick up the shuttle was the proximate cause of the injury; that said employee knew of the presence of the shaft under the sewing machine and that therefore the employer was not liable. The court, however, held that the proximate cause of the injury in this case was the failure of the manufacturer to place guards on the shaft so as to prevent such an accident occurring and so injuring an employee. The South Carolina court stated in one case that a girl who dresses her hair near moving machinery is as a matter of law guilty of contributory negligence.

A Point of Interest

There is one more point of interest to employers in respect to guarding machinery. The question often comes up whether or not portable machinery is included in the statutes requiring machinery to be guarded. Here, as elsewhere, we find the courts divided.

A threshing machine, for instance, is a portable machine. There can be no doubt about its being a dangerous piece of machinery. The question came up in Wisconsin whether the owner of such a machine was required to safeguard it in accordance with the statute. The court held that the act did not apply to portable threshing machines. Although they have not been specifically passed upon in that state it is reasonable to suppose that the court would apply similar reasoning to portable sawmills, tractors, concrete-mixing machines, steam shovels, etc. It does not seem entirely in keeping with the spirit of these acts to exempt this class of machines from the provisions of the statutes.

The federal court, in considering the Washington factory act, very forcefully stated the true rule: "The sole question presented and argued by counsel in this court is whether the plant in question was a 'factory, mill or workshop' within the meaning of the aforementioned legislation of the state of Washington. The court below held that it was not, for the reason that the plant was not located in a permanent building, and should be likened to a threshing machine, a steam shovel, a wrecking car and other similar machines and appliances, and to the small concrete and asphalt mixers which are frequently seen in use upon the streets of cities and towns. We are unable to take that view of this point. That it was built and operated for the purpose of manufacturing out of crude material the finished product with which the defendant company paved streets and roads is not denied. It is true that it was not manufactured in any sort of a house, but we do not understand that a house is an absolutely essential element of either a factory or a mill. It is, of course, readily conceded that a factory usually and perhaps almost invariably embraces one or more buildings, and where machinery constitutes a part of the factory such machinery is undoubtedly usually housed; but even at common law the factory is not limited to the building or buildings, but includes as well the premises or the place where its operations are carried on."

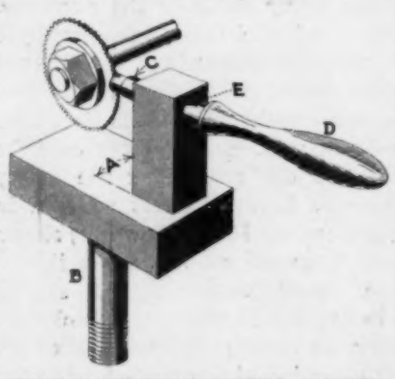
Employers are, of course, interested in the effect of the workmen's compensation acts upon their duty to safeguard machinery, as these compensation laws were enacted subsequent to the statutes requiring machinery to be guarded. In the first place it should be remembered that the compensation laws are not in force in every state of the union as yet and are for the most part optional; that is, the employer and the employee have the right of election as to whether they will come under their provisions or not. It is obvious that an employer who rejects the compensation acts is still liable under the law as it stood before.

Then, again, it should always be borne in mind that the passage of an act awarding compensation to employees does not take away from the employer the duty to safeguard their person and health as before the compensation act was passed. In fact the legal duty of an employer under the statutes requiring machinery to be guarded is not lessened in any particular by the workmen's compensation acts. The duty to prevent accidents and to protect the person and being of employees is an entirely different matter from taking care of them after they are unavoidably injured and incapacitated.

Screw-Slotting Device

By Henry J. Geibel

In the *American Machinist*, page 123, Vol. 48, Paul Hetenyi illustrates an inexpensive screw-slotting device. The illustration shows a device which is simpler and less expensive than the one referred to. It can be attached very easily to the bed of any small bench lathe, and consists of an angle piece *A* which is fastened to the bed by means of the bolt *B* and a large washer and nut. The upright part has a hole drilled through it in line with the center of the saw spindle. A piece of steel *C*, with a hole drilled in it a trifle larger than the body of the screw to be slotted, is inserted in the file handle *D*. This piece extends far enough from the file handle to allow the desired slot to be cut when it is pushed through the hole in the upright. The shoulder *E* regulates the depth of the slot and prevents the saw from cutting into the holder.



SIMPLE SCREW-SLOTTING DEVICE

With this simple device we slot many thousands of screws at the rate of 12 to 14 a minute.

Authorized List of U. S. Government Purchasing Agents

Listed below are the names of the various Government purchasing units with their addresses and the classes of materials handled by each:

Federal Reserve Board

All purchases for the Federal Reserve Board are made through the office of the secretary of the Federal Reserve Board, Treasury Building, Washington, D. C.

Post Office Department

The Post Office Department has but one purchasing agent, J. A. Edgerton, whose offices are located in the Post Office Department Building, Washington, D. C.

United States Fuel Administration

M. A. Downes is the purchasing officer for the Fuel Administration, and all bids on materials may be sent to him.

Government Printing Office

This office has only one purchasing agent or bureau, in charge of Edward S. Moores. The purchasing office is located in the Government Printing Office Building, North Capitol and G Sts. N. W.

War Trade Board

All contracts are awarded through the purchasing agent, A. E. Klinger, whose office is in the building at 20th and C Sts. N. W.

Purchases for branch offices must all be placed through this purchasing agent in Washington when they are in excess of $5.

Interstate Commerce Commission

All purchases for the Interstate Commerce Commission and the awarding of contracts by the commission are under the direction of Chief Clerk and Purchasing Agent W. M. Lockwood, whose office is in the Interstate Commerce Commission at 18th St. and Pennsylvania Ave. N. W., Washington, D. C.

United States Food Administration

All purchasing for the Food Administration is done through open competitive bids to the supply division, of which B. F. Durr is chief.

In each state and in Porto Rico, Alaska and Hawaii there are federal food administrators who are authorized to purchase office supplies without reference to Washington. All the vouchers, however, for expenditures in the state pass through the Washington office for approval.

Department of Labor

The chief clerk of the Department of Labor is its purchasing agent, the detailed work connected therewith being performed by the Chief of the Division of Publications and Supplies.

The location of the department building is 1712-1722 G St. N. W.

The bureaus are as follows: Bureau of Immigration, Bureau of Labor Statistics, Children's Bureau, Bureau of Naturalization, Department Building; Bureau of Industrial Housing and Transportation, 613 G St. N. W.; United States Employment Service, Gordon Hotel, 916 16th St. N. W.

All of the bureaus make their purchases through the central purchasing agency, the Division of Publications and Supplies.

Department of State

All supplies for the State Department proper are ordered by the chief clerk of the department, supplies for the consular service by the chief of the Consular Bureau, and those for the diplomacy service by the chief of the Diplomatic Bureau, and all supplies are purchased, as far as possible, under the contracts awarded by the general supply committee. Where it is necessary to purchase goods not on the general supply schedule, separate contracts are called for and bids sent to not less than three bidders in Washington if possible, and if not, wherever they may be found.

United States Shipping Board

Purchasing and assistant purchasing officers of the Emergency Fleet Corporation with their respective addresses:

F. A. Browne, general purchasing officer, 140 North Broad St., Philadelphia, Penn.; A. L. Bell, assistant general purchasing officer, 140 North Broad St., Philadelphia; H. L. Lewis, assistant purchasing officer, 140 North Broad St., Philadelphia; G. R. Jasper, assistant purchasing officer, 140 North Broad St., Philadelphia; K. Fawcett, assistant purchasing officer, 140 North Broad St., Philadelphia; E. F. Tomlinson, assistant purchasing officer, 140 North Broad St., Philadelphia; J. K. Fawcett, assistant purchasing officer, 140 North Broad St., Philadelphia; F. K. Paxton, assistant purchasing officer, 140 North Broad St., Philadelphia; W. R. McCann, assistant purchasing officer, 140 North Broad St., Philadelphia; R. J. Lyons, assistant purchasing officer, 140 North Broad St., Philadelphia; J. A. Manion, district purchasing officer, Securities Building, Seattle, Wash.; T. G. Plant, district purchasing officer, 343 Sansome St., San Francisco, Cal.; W. J. Haynen, district purchasing officer, 430 Audubon Building, New Orleans, La.; R. E. Heizer, district purchasing officer, Heard Building, Jacksonville, Fla.; E. L. Marshall, district purchasing officer, Custom House, Boston, Mass.; F. C. Selby, district purchasing officer, 615 Lexington Building, Baltimore, Md.; S. E. Lewis, district purchasing officer, Perry-Payne Building, Cleveland, Ohio; C. P. Morrell, district purchasing officer, 115 Broadway, New York.

War Department

Ordnance Department, Procurement Division, Sixth and B Sts., Washington, D. C.—Cannon and artillery; apparatus and machinery for service and maneuver of artillery; artillery ammunition; small arms; small-arms ammunition and accouterments; tools, machinery, and materials for ordnance service; tanks; bombs and trench-warfare materials; testing appliances, instruments, etc.; optical instruments; steel-mill products; office supplies.

Corps of Engineers, General Engineering Depot, 1438 U St., Washington, D. C.—Paints; railway-construction materials; machinery and tools; locomotives and rolling

stock; electrical equipment and supplies for overseas; sawmill and woodworking equipment; demolition explosives; mechanical rubber goods; office supplies; chain.

Quartermaster's Corps, 18th St. and Virginia Ave., Washington, D. C.—Textiles, yarns, and threads; cotton and wool; clothing and personal equipment; rubber and rubber goods (other than mechanical); laundry equipment and supplies; reclamation, reduction and repair plants and equipment; food, forage; horses and mules; harness and horse equipment; vehicles; motor vehicles; hardware; kitchen equipment; tobacco; office supplies.

Surgeon General's Office, Medical Department, General Purchasing Office, Seventh and B. Sts., Washington, D. C.—Medicines, surgical instruments, surgical dressings, dental supplies, veterinary supplies, hospital equipment, sanitary appliances, office supplies.

Construction Division, Procurement Branch, Seventh and B Sts., Washington, D. C.—All materials and articles entering into construction projects, such as buildings, wharves, roads, sewers, power stations, etc., in the United States, including lumber, roofing, hardware, heating, plumbing, refrigerating, ventilating, water supply, sewage disposal, kitchen equipment, fire apparatus, light and power, and office supplies.

Aircraft Production, Director of Purchases, 119 D St. N. E., Washington, D. C.—Airplanes and parts; airplane engines and parts; balloon equipment; special aircraft chemicals, paints and varnishes; aircraft lumber, veneers and ply wood; airplane fabrics; aviation clothing; castor oil and castor beans; office supplies.

Signal Corps, 119 D St. N. E., Washington, D. C.—Batteries, technical instruments, telephone and telegraph line materials, telephone and telegraph wire and cable, field glasses, radio apparatus, telegraph apparatus, telephone apparatus, wood distillates, office supplies.

Edgewood Arsenal, Purchase Section, 311 West Monument St., Baltimore, Md.—Acids and chemicals.

Supply Division, Mills Building, Washington, D. C.—Office equipment and supplies.

Gas Defense, Procurement Department, F Group, Seventh and B Sts., Washington, D. C.—Gas masks, special gas-defense appliances.

Department of the Interior

Purchasing agents or bureaus and their locations under this department are as follows:

E. J. Ayers, chief clerk, Washington, D. C.

General Land Office—Frank M. Johnson, supervisor of surveys, Denver, Colo.; John D. Yelverton, Chief of Field Service, Washington, D. C.

Office of Indian Affairs—Frank Sorenson, superintendent United States Indian warehouse, 308 South Green St., Chicago, Ill.; Burton B. Custer, superintendent United States Indian warehouse, 310 Elm St., St. Louis, Mo.; Richard C. Jordan, superintendent United States Indian warehouse, 608 Howard St., San Francisco, Calif.

Reclamation Service—Emmett Carr, Washington, D. C.; A. McD. Brooks, purchasing agent, Reclamation Service, Denver, Colo.

Bureau of Education—Dr. John H. Francis, director of School and Home Gardening, Washington, D. C.; Harry C. Sinclair supply agent for Alaska Division, L. C. Smith Building, Seattle, Wash.

National Park Service—Dr. William P. Parks, superintendent, Hot Springs Reservation, Hot Springs, Ark.; Chester A. Lindsley, acting superintendent, Yellowstone Park, Wyo.; Walter Fry, superintendent, Sequoia and Gen. Grant Parks, Three Rivers, Calif.; W. B. Lewis, superintendent, Yosemite Park, Yosemite, Calif.; D. L. Reaburn, superintendent, Mount Rainier Park, Ashford, Wash.; Alex Sparrow, superintendent, Crater Lake Park, Crater Lake, Ore.; T. W. Brazell, superintendent, Wind Cave Park, Hot Springs, S. D.; R. A. Sneed, superintendent, Platt Park, Sulphur, Okla.; Thomas Rickner, superintendent, Mesa Verde Park, Mancos, Colo.; Walter W. Payne, superintendent, Glacier Park, Belton, Mont.; L. Claude Way, superintendent, Rocky Mountain Park, Estes Park, Colo.

St. Elizabeth's Hospital—A. E. Offutt, St. Elizabeth's Hospital, Washington, D. C.

Freedmen's Hospital—Dr. William A. Warfield, Freedmen's Hospital, Washington, D. C.

Howard University—George W. Cook, Howard University, Washington, D. C.

Alaskan Engineering Commission—C. E. Dole, general purchasing agent, Alaskan Engineering Commission, 422 Bell St. Terminal, Seattle, Wash.

All advertisements for general supplies for construction of buildings and other works of any magnitude are passed through the department, and copies of these advertisements will appear in *The Official Bulletin.*

Department of Commerce

List of bureaus or offices with purchasing officers and their addresses:

Office of the Secretary (general department and bureau supplies), E. W. Libbey, chief clerk, Room 719, Commerce Building, 19th St. and Pennsylvania Ave. N. W.

Bureau of the Census, Thomas J. Fitzgerald, chief clerk, Room 518, Commerce Building.

Bureau of Foreign and Domestic Commerce, Nicholas Eckhardt, Jr., chief clerk, Room 1120, Commerce Bldg.

Bureau of Standards, S. W. Caywood, purchasing officer, Room 300, South Building, Connecticut Ave. and Pierce Mill Road.

Bureau of Fisheries, I. H. Dunlap, assistant in charge of office, Room 5, Fisheries Building, Seventh and B Sts. S. W.

Bureau of Lighthouses, district lighthouse inspectors, as follows:

First district, Portland, Me., Y. M. C. A. Building; Second district, Boston, Mass, Custom House; Third district, Tompkinsville, N. Y.; Fourth district, Philadelphia, Penn, Post Office Building; Fifth district, Baltimore, Md., New Custom House; Sixth district, Charleston, S. C., Old Post Office Building; Seventh district, Key West, Fla.; Eighth district, New Orleans, La., Custom House; Ninth district, San Juan, P. R.; Tenth district, Buffalo, N. Y., Federal Building; Eleventh district, Detroit, Mich., Post Office Building; Twelfth district, Milwaukee, Wis., Federal Building; Thirteenth district, Rock Island, Ill., Federal Building; Fourteenth district, Cincinnati, Ohio, Custom House; Fifteenth district, St. Louis, Mo., Custom House; Sixteenth district, Ketchikan, Alaska; Seventeenth district, Portland, Ore., Custom House; Eighteenth district, San Francisco, Cal., Custom House; Nineteenth district, Honolulu, Hawaii, McCandless Building.

Coast and Geodetic Survey, P. A. Welker, hydrographic and geodetic engineer in charge of office, Room 3, 205 New Jersey Ave. S. E.

Bureau of Navigation, Arthur J. Tyrer, deputy commissioner of navigation, Room 917, Commerce Building.

Steamboat-Inspection Service, Dickerson N. Hoover, Jr., chief clerk, Room 1022, Commerce Building.

Organizing Research Work on a National Scale

The proposal has been many times made that the work of scientific and technical research now carried on independently by a number of institutions and individuals should be organized nationally. Such an organization would make unnecessary a vast amount of duplication of work. It would further be possible, by concentrating research workers on a particular task, to make more rapid progress, and by giving the results of successful research greater prestige and standing it would secure the adoption of new developments in practical work to a greater extent. The magnitude of the task of controlling and coördinating the research work of the country is such that no serious attempt has ever been undertaken until the war brought home the need and opportunity.

Two years ago President Wilson accepted an offer by the National Academy of Sciences to undertake the organization of the scientific resources and research facilities of the country. In accordance with this offer the National Research Council was organized a year in advance of this country's declaration of war, and it was officially recognized by the Council of National Defense to serve during the war as a department of that body early in 1917.

While the National Academy of Sciences, from which the National Research Council sprung, deals only with so-called pure science, it was recognized from the outset that the business of the council was to promote research which aimed at definite, practical results.

Its Practical Work

The executive order of President Wilson, issued on May 11, recognized the work which has already been accomplished by the council and ordered the coöperation with it of the scientific and technical branches of the Government. The practical nature of the council's work was attested by the fact that its first financial support came from the Engineering Foundation and that Governmental appropriations to the amount of $270,000 have been made to finance special branches of its work.

The work accomplished by the council and its organization and plans were the subject of an address by the council's chairman, Dr. George Ellery Hale, on May 28, before a joint meeting of the National Engineering Societies in New York.

As much of the research directed by the council relates to apparatus useful in the war, detailed statements concerning such work cannot be made public. It can be said, however, that among the problems with which the council is dealing are processes for making nitrates, the manufacture of optical glass, materials conveniently located for highway construction along the Atlantic coast, methods of combating the submarine, the development of body armor, range finders, location of enemy heavy artillery by sound, psychological tests of recruits.

In his address Dr. Hale emphasized that the council recognizes the great value of individual initiative and direction, and it will aim to coöperate with the individual worker and not to supersede him. A statement of Dr. Hale's which won hearty applause was the following: "It should be said here, once for all, that the policy of the National Research Council has been from the outset invariably to recommend the immediate development and utilization for military and naval purposes of the best devices or methods known at the time, with the understanding that research for the purposes of improving such devices should not retard production demanded to meet pressing military needs."

Bureau of Standards

In the special work of coöperating with existing research agencies a census has been taken under the direction of Dr. S. W. Stratton, Chief of the Bureau of Standards, of the research workers and facilities in the universities, manufacturing plants, federal Government bureaus, commercial testing laboratories, etc., throughout the United States. Another committee, of which Dr. John C. Merriam of the University of California is chairman, has secured the organization of local research committees in 72 universities and colleges to coöperate with the National Council and in many cases with local industries.

There has also been organized with the approval and coöperation of the Secretaries of War and the Navy a committee to interchange technical information and the results of research work with the authorities of Great Britain and France. This committee has offices in Paris, London and Washington. Dr. W. F. Durand represents the committee in Paris and Dr. H. A. Bumstead in London. The Council of National Defense has provided funds to the amount of $38,400 for this committee's work for the current year.

In the direct carrying on of research the council is coöperating with Government and other organizations, such as the Bureau of Mines, the Bureau of Standards and others. The Division of Engineering is now under the chairmanship of Dr. Henry M. Howe.

At present the council, in coöperation with the Engineering Foundation, is undertaking a campaign for the promotion of industrial research by commercial organizations. The work is in charge of a strong committee on which the heads of the leading industrial research laboratories are represented. To back this movement an advisory committee has been formed made up of Elihu Root, E. W. Rice, Jr., president of the General Electric Co., Theodore N. Vail, Dr. Henry S. Pritchett, George Eastman, Pierre S. du Pont, A. W. Mellon, E. H. Gary and Cleveland H. Dodge. The committee held its first meeting in New York on May 29.

Fulton Shell Lathe—Erratum

On page 1075, Vol, 48, the name of the sales agents for the Fulton shell lathe was given incorrectly. The machine is being marketed by the Dale-Brewster Machinery Co., Chicago, Ill.

SIDELIGHTS

EDITED BY E. C. PORTER

In an attempt to remedy the congestion which is affecting traffic and fuel conditions in the East the War Industries Board, coöperating with the Railroad and Fuel administrations, has prescribed a district in which manufacturers must not increase war orders or the number of plants engaged on them above a certain limit. This district includes New England, eastern and southern New York, eastern Pennsylvania to Williamsport and Altoona, New Jersey, Delaware and eastern Maryland, excluding Baltimore.

* * *

To comply with the desires of the military authorities that all possible secrecy shall be preserved as to the movements of troop trains, a general notice has been issued on all divisions of the Pennsylvania Railroad Lines East, including the West Jersey & Seashore Railroad and the New York, Philadelphia & Norfolk Railroad, forbidding the practice of blowing shop and locomotive whistles as a salutation when troop trains are observed passing. Whistles will hereafter remain silent during the movements of troop trains except for the giving of proper and necessary signals.

* * *

Mrs. Annie Jowitt of England, according to advice, has the distinction of being the first person to enter the Norton Co.'s employment as a saleswoman. She took over her husband's business which was conducted under the name of Messrs. George Jowitt & Sons at Sheffield, England, when he took up other work relative to the war. While it has been demonstrated that women have ability to engage in most lines of work and become successful, so far as known this is the first instance where one has attempted to sell grinding wheels. From all reports she is apparently making good in her new endeavor.

* * *

The chief of the equipment branch of the General Staff announces that a new collar insignia had been adopted for the Army Air Service. It consists of a pair of horizontal bronze wings, similar to a colonel's eagle's wings, with a silver two-bladed propeller placed vertically on the wings. The new insignia will be worn by officers and enlisted men of the Department of Military Aeronautics and the Bureau of Aircraft Production, and it takes the place of the torch and crossed flags worn by them when under the Signal Corps. The hat cord for enlisted men of these two branches of the air service will be green and black.

* * *

Three thousand workers of the New York Shipbuilding Co. will be provided a model shipworkers' town to be built at Camden, N. J. It has been planned by the Emergency Fleet Corporation, and in three months it is expected that the homes will be ready for occupancy. This town is to be known as Haddon Township, and will consist of 987 houses, mostly brick, detached and in rows. They will cost on an average of $3070 each. The total cost of building them will be between $2,000,000 and $2,500,000, while the cost of laying out the site with all improvements, parks, playgrounds and other features of a town will be about $325,000.

* * *

The gas-defense service is now manufacturing about 5000 horse gas masks a day. These are being sent to France, and it is expected that in a short time every horse connected with the American Expeditionary Forces will be equipped with the new mask. The gas-defense service has a completely equipped factory for the manufacture of the masks. In less than three weeks a building was selected and the factory was producing masks. The introduction of riveting machinery has done away with the heavy hand sewing of the frame which supports the masks on the faces of the horses. The mask is so constructed that no metal or chemically impregnated parts can chafe the horse. A distinct advantage is that the masks can be placed securely on the heads of horses that are not wearing harness. This feature will result in saving many horses, as it has frequently happened that horses were overcome by gas because they were not wearing harness to which the masks could be attached.

* * *

During the past 18 months the Ford Motor Co. has established what may be considered as two new world's records—this time along the lines of accident prevention. The first record is a reduction of lost-time accidents, 74.2 per cent. during the 18-months' period. The second record centers in the fact that the company was able to go 11 months without a fatal accident, the first fatality in almost a year occurring on Apr. 20, 1918. In April of this year still another record was established when but 46 lost-time accidents were recorded for the 26 working days. This means that the average number of accidents per 1000 employees was only 1.4 and the number of minutes lost, if distributed over the entire working force, would equal but 7.3 minutes per employee for the month. It is very seldom that a town of 5000 to 10,000 population goes through a year without losing one or more men through factory accidents. Estimating that Ford workers, with their families, would make up a city of 150,000 population alone, one would not be surprised to hear of a considerable number of lives being sacrificed yearly.

* * *

The Department of Labor, through the United States Employment Service, is seeking a standardization of wage scales for common and skilled labor in war industries. Such equalization, it is contended, is essential to the success of the Government's efforts to more rapidly and equitably distribute the available supply of workers. The great discrepancies in wages in different industries

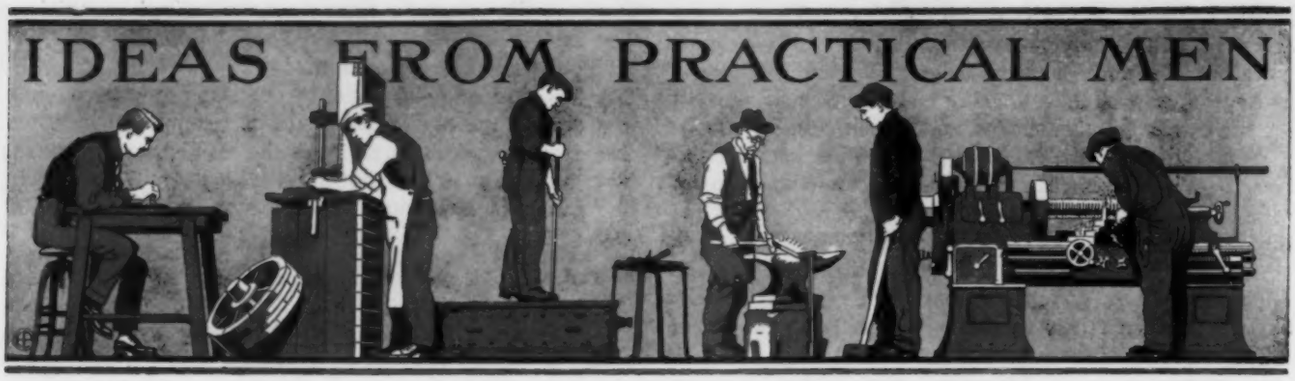
and in different sections of the country make it impossible to stabilize employment conditions, facilitate labor "stealing" by one essential industry at the expense of another, and, with poor housing conditions, contribute to the enormous labor turnover which, according to Secretary of Labor Wilson, is as high as 100 per cent. a week in some plants. On top of a growing shortage of common labor, the widely varying wages offered—some sections offering twice as much as others—are placing the efforts of the Employment Service to supply laborers under an almost impossible handicap. And the same holds true of its skilled workers, recruiting and distributing activities. The lack of standardized wage scales in war production, I. W. Litchfield, chief of the clearance section, said, has been one of the greatest obstacles which has come to the attention of the Employment Service. Recently an industrial district near the South Atlantic seaboard was offering 22 cents an hour for common labor. Up in New England at the same time the offer was 40 cents, while a third district west of the Ohio River was drawing common laborers with the magnet-like wage of 50 cents an hour. Similar inequality prevailed in the wages offered skilled labor. One large plant manufacturing guns sent in an "S O S" call for toolmakers. But it offered 65 cents an hour, while other concerns, some of them not far distant, had wage scales ranging from 72½ cents to 80 cents an hour.

* * *

The educational institutions of the country are doing their part in the training of men for service in special branches of the army. A report from the University of Pittsburgh shows how that institution, which is training drafted men for service, has met the problems of instruction, material and housing which have arisen in organizing the work on a rapidly expanding scale. When the plan for the utilization of facilities of educational institutions was announced in March the board of trustees of the University of Pittsburgh discussed the question whether they could provide facilities for training and housing 100 men at a time. Less than a month later 326 men were undergoing training at the university. At the end of the second month this number had risen to nearly 650. It will be increased to 1000 by June 15 and probably to 2000 by Aug. 1. The work at this university was confined to the training of gas-engine and automobile men, first, because there were a number of members of the faculty who were specialists in gas engines; second, because there were in the city many automobile-repair shops from which practical men could be taken to give the instruction, and, third, because the city offered an opportunity for obtaining without transportation a large variety of worn and broken automobiles. The problem of instruction has been met by collecting about 45 of the best automobile-repair men in the city who under the leadership and coaching of faculty members have proved successful teachers. The material for use in the course comes from three sources: new trucks and engines from the Government, old and dilapidated cars which have been purchased outright by the university and cars and trucks in need of repairs which are obtained from firms and individual owners. Owners of cars pay for new material, but no charge is made for labor. The owner is allowed to choose whether he will have his car put in "first class," "fair," or "running" condition. The university has provided shop equipment and individual tool kits for each student. The housing problem was met by making use of the armory, gymnasiums and other buildings which could be temporarily adapted for sleeping purposes and for the feeding of the men. Barracks now are being built which by Aug. 1 will accommodate 2000 men. Shops have been built for 580 men.

* * *

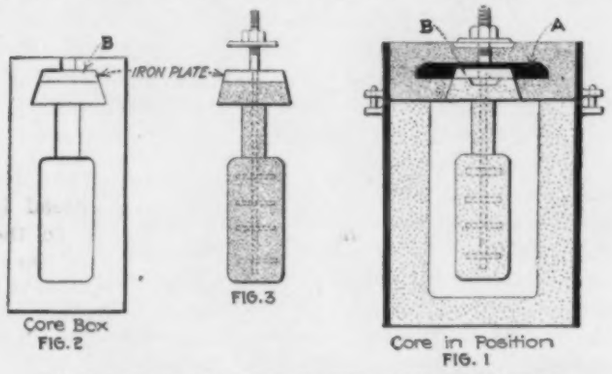
Before an airplane can be put into military service it must be equipped with a number of delicate aeronautical instruments that are absolutely essential to exact flying and to successful operation and without which a pilot would soon lose his location as to height and direction. He would not know his speed through the air, the speed of his propeller, the amount of gasoline in his tank, the temperature of his cooling water, whether his oil was circulating, or whether he was banking properly on his turns. Without an oxygen-supplying apparatus an operator could not fly to any great height, nor could he operate his guns, signal, release bombs or "shoot" his cameras without some special delicate instrument. For the operation of combat planes, such as those devoted to observing photographing, bombing, etc., many other complicated instruments and sets of apparatus are necessary. Among them are machine guns, gun mounts, synchronizers, bomb racks, bomb-dropping devices, bomb sights, radio, photographic and oxygen apparatus, electrically heated clothing, lights and flares. Another instrument used is the tachometer, or revolution counter. This instrument indicates the number of revolutions a minute at which the engine is running. Unlike the speedometer on an automobile it does not translate revolutions into miles an hour. The air speed indicator is a pressure gage for showing the speed of the plane in relation to the air, not the earth. This includes what is known as a Venturi-Pitot tube, which is fastened to a strut and takes in air from ahead. The air sets up a corresponding pressure in an auxiliary tube, which is calibrated and indicated on a dashboard recording pressure gage. The altimeter is an aneroid barometer graduated to read height above the earth instead of pressure. It is made with a range of 20,000, 25,000 and 30,000 ft. Two types of pressure gages are used—one to register the air pressure which forces the gasoline into the engine and the other to show the pressure produced in the oiling system by the oil-circulating pump. The radiator thermometer is an instrument mounted on the instrument board, where it indicates the temperature of the cooling water in the engine. Undue heating shows that the engine is not running properly or that more water is needed. The banking indicator is another instrument used to show when a plane is correctly banked in making a turn. Spirit-level balance and gyroscopic types are being used. The Aldis sight is used in connection with fixed guns firing through the propeller. Among other things are an airplane compass, clocks, safety belts, etc. In some instances, particularly for the two-seaters and the heavy-bombing machines, two or three sets of instruments and apparatus are necessary, totaling sometimes as many as 23, but for ordinary work only about nine of them are needed. The average cost of a set of navigation instruments for a single plane is $350.



How Would You Make This Casting?

BY JOHN COMPO

An alternative casting method illustrated on page 956, Vol. 48, by M. E. Duggan as the best method of producing the required casting is no doubt satisfactory for foundries where only one casting of this particular



FIGS. 1 TO 3. THE MOLD, CORE BOX AND CORE

Fig. 1—Details of complete mold with core. Fig. 2—Core box for special cylinder core. Fig. 3—Completed core ready for placing in mold

design is required, but might not pay where this style of casting is being made every day because of the cost of machining, plugging, etc.

I handle hundreds of these cast bushings in ordinary times, but accomplish this in a different manner by making a special-top part-iron plate, as *A*, Fig. 1, with a circular recess turned out to fit a turned plate *B*. This plate *B* is rammed up with cone forming part of core iron, as in Fig. 2. The completed cone, detailed in Fig. 3, is bolted up to the cope, as in the assembled view, and insures the whole being perfectly rigid and central.

My fear at first was that the pressure of metal might move the cone, but this has never occurred, and the castings have all turned out satisfactorily. The initial cost has to be considered, but the first 20 castings will more than compensate for the outlay.

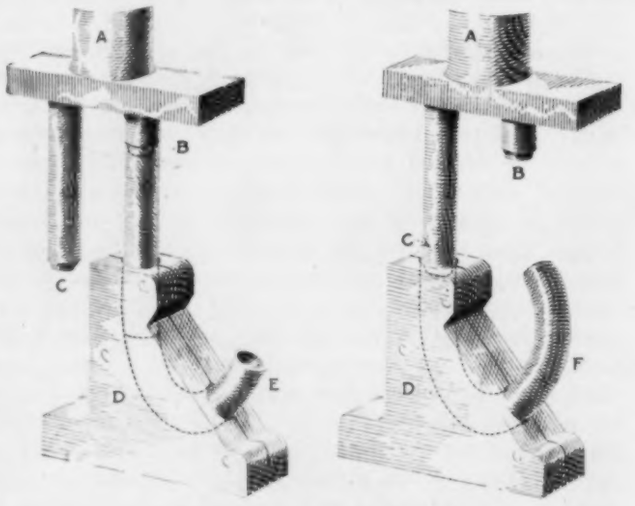
How Would You Form This Tube?

BY A. J. CHAMBERLAIN

In reply to the above query of G. R. Smith on page 294, Vol. 48, of the *American Machinist*, I submit the following described and illustrated method for accomplishing the work. I would suggest using seamless-steel tubing of $\frac{3}{4}$ in. diameter with 0.030 wall. As the tube will come in lengths of 10 or 12 ft. the first operation will be cutting the pieces to length, which can be quickly and satisfactorily performed with an abrasive-wheel cutting-off machine. These little machines will cut off tubing very rapidly; one installed by the writer for cutting off tubing about $\frac{9}{16}$ in. in diameter was operated by a boy at a piecework price of 3c. a hundred pieces.

In order to form these pieces on the punch press of which Mr. Smith speaks, which has a 4-in. length of stroke, I would make the die shown in illustration.

The punch holder *A* would contain two driving punches shouldered to fit the tube, as shown at *B* and *C*. The curling die *D* would be made in halves to facilitate machining the curved hole, and these halves would then be doweled and screwed together permanently. The



THE FORMING OPERATION

die would have to be fitted to a sliding base, as it would be necessary to employ one stroke of each punch in order to force the tube into the die to a distance of $7\frac{1}{2}$ inches.

With the die in the position shown at the left the first stroke of the short punch *B* would force the tube about $3\frac{3}{4}$ in. into the die. The operator would then slide the die to position shown at the right for the second stroke, and the long punch *C* would force the tube the remaining distance into the position shown at *E*. Another tube would then be inserted and the next stroke of punch *B* would force the first tube into the position *F*. Upon the following stroke the punch *C* would eject the finished tube from the die. A completely bent tube would thus be produced at every other stroke of the press.

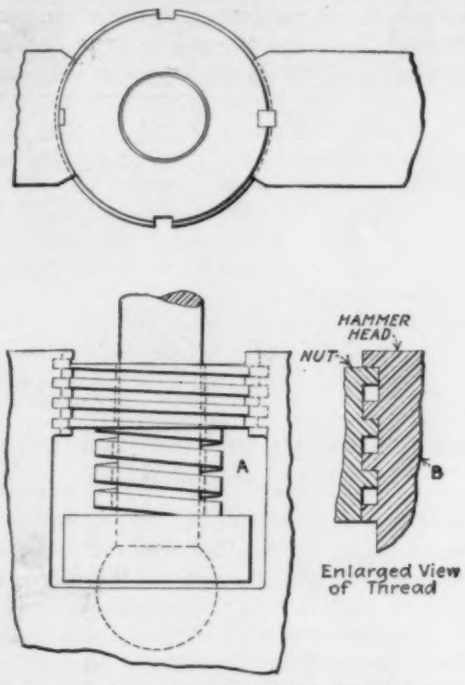
The sliding die would of course have to be equipped with suitable guides and positive stops.

Ball-Joint Piston Rod for Steam Hammer

By Edward L. Robenolt

On page 672, Vol. 48, of the *American Machinist* J. C. Larson criticises an article under the above head, but gives no reason, good or otherwise, why it was "a miserable failure."

I personally made the design of the rod installed at the Osborne Works under the direction of their then master mechanic. This design shown at *A* in the illustration was a failure, because in assembling the nut was not screwed down upon the spring hard enough to prevent its pounding the thread off by reason of the inertia of the nut and the suddenly arrested movement of the parts.



BALL JOINT IN STEAM HAMMER HEAD

The trouble was partially corrected by cutting a new thread in the hammer head and making a nut in which the threads were partially cut away, as shown at *B*, so that the thrust, or pound, would come entirely upon the spring. Four keyways were cut in this nut, as shown in the plan view, for the purpose of locking the nut in position so as to maintain the pressure upon the spring that otherwise might become released by the gradual unscrewing of the nut. The rod was run about five months, this being the length of time the master mechanic remained in the employ of the company, after which the regular rod and head were replaced.

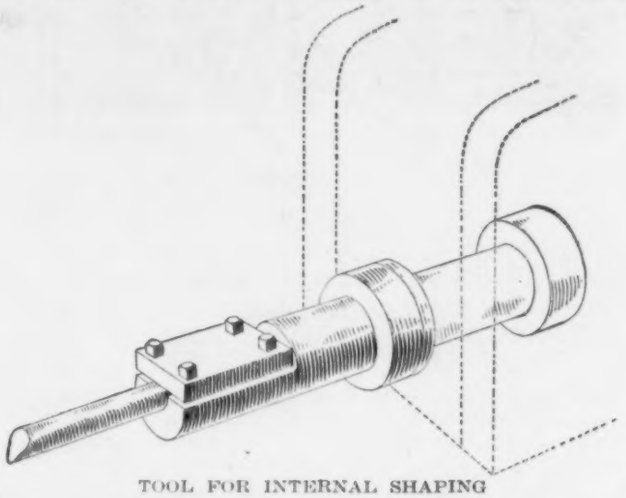
Before this rod was installed at the Osborne Works a letter of inquiry was sent to the Studebaker Co. of South Bend in reference to a similar device in use at their plant. Though I have never seen the hammer at the Studebaker plant I did see their reply to the above-mentioned letter, and this reply stated that "the hammer in question has been in use for several years and is still giving good service." The Studebaker hammer was designed in 1906, while the one at the Osborne Works was not installed until 1914.

I believe that the design shown on page 389 is better than either of those above mentioned.

Tool for Internal Shaping

By Harry Lauterbach

The sketch submitted illustrates a shaping-machine toolholder that we have found to be ideal for internal shaping. Its range is very wide; in fact it can be set in any conceivable position. I have used it frequently and found there is no tendency to gouge or ride over the job. The holder is made to fit the seat of the toolpost in the clapper box, and the body of the holder is made slightly smaller than the hole; a thread is cut on the body for the nut which clamps it to the clapper. Holes are drilled at quarters in the nut for a pin or spanner wrench. A slot is planed in the holder for the tool and four holes are drilled and tapped two on each side of the slot for capscrews to fasten the cap over the tool.

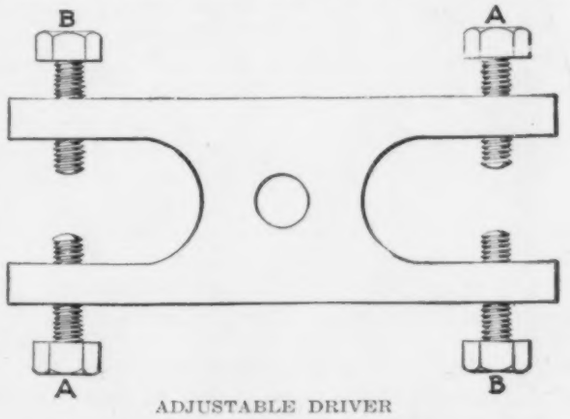


TOOL FOR INTERNAL SHAPING

Adjustable Driver

By A. E. Holaday

The accompanying sketch shows a dog driver for a universal milling machine. All dog drivers for milling machines have two screws *A*, one on each opposite end. In making special small tools it is desirable a great many times to move the tail of the dog a few thousandths of an inch in milling flutes or for clearance. By placing two additional screws *B* on the driver it is possible to get very close adjustments, and I have found it has saved my departments a great amount of time.

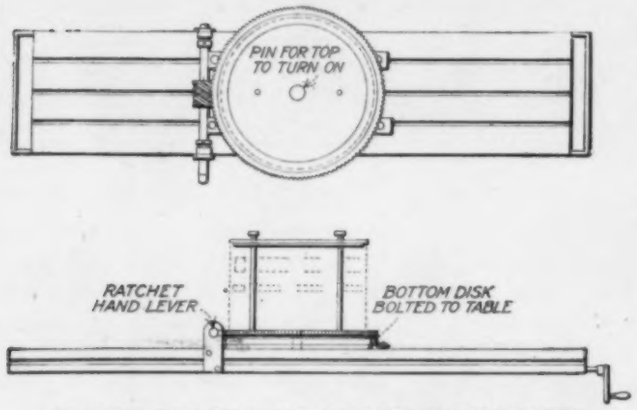


ADJUSTABLE DRIVER

Milling Inlet Ports in Piston-Valve Cages

By C. A. Hausmann

On page 935, Vol. 47, Fig. 1, is a very familiar picture which brings to mind the time when I started an apprentice boy on the job of milling the inlet ports in these



ROTARY FIXTURE FOR MILLING VALVE CAGES

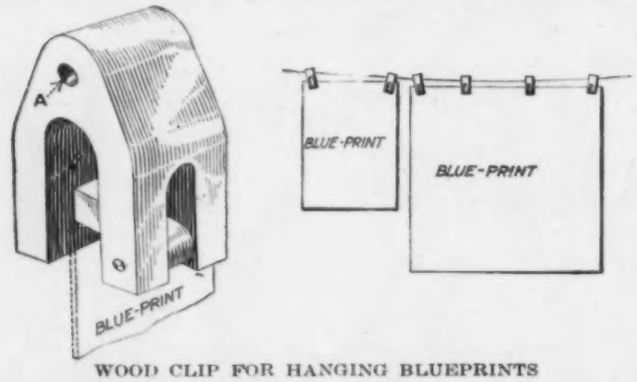
valve cages, an operation that had previously been performed by slotting.

I conceived the idea of a rotary device for doing this work, and finding much of the material ready to hand I built the fixture shown in the illustration with which we were able to increase the output from four cages a day to over four times that number.

A Handy Clip for Hanging Wet Blueprints

By E. [illegible] Gibson

Draftsmen will agree that the market has little to offer in the way of a convenient device for hanging blueprints to dry. Except in the case of such drafting rooms as are equipped with elaborate drying and ironing machines, little consideration is given to the



WOOD CLIP FOR HANGING BLUEPRINTS

matter, the problem usually being left to the blueprint boy, who hangs them to dry on lines and sticks in much the same manner as the first blueprint on earth was dried. Prints dried by this primitive method are wrinkled and present an untidy appearance in general even before being used; but we have learned to accept this condition as a matter of course where there is no ironing machine.

The illustration shows a home-made blueprint clip which the writer has found to answer the requirements satisfactorily. It is made of wood and consists of a body having a large open slot in one end and a trigger hinged at right angles to this slot. The trigger must work freely in order that it may fall into place of its own weight. The length of the trigger must be so calculated that the outer end strikes the opposite side of the slot at a point slightly above the center line. A small nail or wire serves as a hinge for the trigger. A hole is made in the body, as at *A*, and a number of the clips, depending on requirements, are strung on a line. At least two clips must be used to hang one blueprint, but three or four should be used for the larger-sized sheets to make them hang smoothly. The hole should be made no larger than necessary, so that if the clip is pulled to an oblique position it causes a binding action. This feature is useful for the purpose of stretching the blueprints and making them hang smoothly. The clips in the corners of the blueprints shown are used in this manner. These clips require no manipulation except to slide them into place on the line, which can easily be done while holding the wet blueprint in the hands. Blueprints dried on these clips are as smooth as if ironed.

A Suggestion to the Employment Man

By A. J. Chamberlain

In these days of labor scarcity the employment department of an organization often has trouble in procuring enough competent help to meet the demand, particularly in the skilled mechanical lines, and sometimes it finds it necessary to hire men with little or no experience, who by close supervision and training at the company's expense can be developed into competent workmen. Most plants large enough to warrant the expense maintain an employment department through which the needed help is procured for all departments of the organization. Sometimes the employment department finds it necessary to resort to newspaper advertising in order to increase the number of applications for employment, and when this is done there is often a flood of applicants, many of whom belong to the floating class, who have formed a habit of applying for work somewhere at regular intervals. As constant practice at any one task will make a man proficient, many of these habitual floaters are quite successful in "landing a job," and if necessary will often misrepresent themselves in order to accomplish their purpose. When hired they generally require an unusual amount of supervision; will spoil work; perhaps increase the maintenance expense by abusing machinery and tools, and seldom stay long enough to become efficient at any line of work, due either to their being dismissed or to their roving spirit.

The reason why a floater will quit his job so readily or cause himself to be dismissed is because he knows there are other jobs open and he has confidence in his ability to land one, and the reason why he seldom has trouble in landing one is generally because some brother floater has made an opening for him. This floating evil will undoubtedly never be checked until employers cooperate with each other by finding some method of employment which will discourage the practice.

Of course results have been accomplished in this direction already by such means as the yearly bonus plan,

group insurance and factory welfare work, but the chronic floater who has the roving spirit in his very blood seldom stays long enough to appreciate these advantages. I have a suggestion to offer to the man who does the hiring, which will asist him in securing a larger percentage of efficient men. In my experience I have found that better results were obtained from men who had been recommended by other workmen in the plant than from the regular applicants for employment.

A reliable workman will seldom recommend a poor workman to his employers. Very often he knows of a good man who is working temporarily at some work other than his own, or perhaps he has heard a good man among his friends express his intention of changing his job. My suggestion to the employment man is to install a blackboard in each department of the factory and post all help needed in the whole organization on each board daily, at the same time erasing all jobs that have been filled. Such a board is shown in the sketch. I believe the applicants procured through this means will score a higher average in points of efficiency than those procured by ordinary employment department methods.

NOTICE TO EMPLOYEES

THE FOLLOWING POSITIONS ARE OPEN TO DAY

CLASS OF HELP NEEDED	DEPT. NO.
Boring Mill Hand	9
Bench. Press Hand capable of setting up dies	14
Bench Press Operator	14
Machinist for repair work on machinery & jigs	6

DO YOU KNOW A MAN LOOKING FOR ANY OF THE ABOVE POSITIONS WHO IS WORTHY OF YOUR RECOMMENDATION ? IF SO ; KINDLY ADVISE YOUR FOREMAN

EMPLOYMENT DEPT.

THE BLACKBOARD

Looking at the matter from the applicant's side, he naturally conceives the idea that the factory must be a good place to work or his friend who works there would not have recommended the opening to him.

Very often the applicant is one who at some time has worked with the man who recommended him and who knows his ability.

Such a plan if carefully carried out will help to develop a better organization, tend to discourage the floating evil and the workman will appreciate the opportunity afforded him to procure a job for his capable friend. If the workman is a steady man himself he will not recommend a man who is continuously changing jobs, because he realizes the disadvantages of hiring such men. I once had a bench hand, who was a foreigner and a steady capable workman, ask me if there was an opening for a friend of his who in his opinion was a good man. I told him to send this man over for an interview and hired him in spite of the fact that his tale of experience and general appearance did not make a favorable impression and would undoubtedly have caused him to be rejected for the position by most employment men. I would not have hired him were it not for the fact that the good workman had recommended him. That man is perhaps the most efficient worker in his department today, and the man who recommended him has won quite a reputation as a judge of good workmen by recommending many other capable men. He happened to have a large acquaintance among his own nationality and possessed the faculty of knowing who among his friends were capable men.

That foreigner aided more in the development of efficiency in one department by coöperating with the management in the selection of help than a skilled employment man could have done because he had more opportunities to acquire accurate inside information regarding the applicants he recommended.

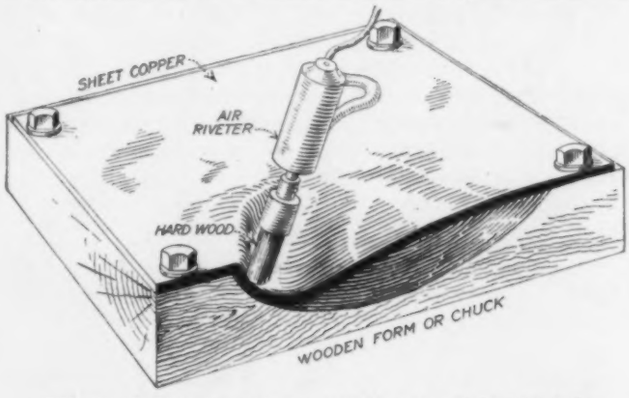
Although this method of obtaining help is as old as the hills and greatly used by the small shop owners who recognize its advantages, I believe it could be adopted by the modern employment department of a large plant advantageously, through such means as I have outlined. This method of employment is not a knock-out blow to the chronic floater, but it is a step in that direction, as it will help to discourage the practice.

Forming Sheet-Metal Work With Air Hammer

By Harvey Feldmeier

I recently had occasion to spin some large copper sheets in making dished heads for special tanks. This involved the making of spinning chucks and improvising a lathe consisting of a wooden frame, a spindle, spindle bearings and pulleys.

The actual spinning operation is simple, but when only a few pieces are to be made and no lathe or means of swinging a spinning chuck is available it is not often convenient. In such cases it is customary to raise the sheets by hammering them on a wooden block.



FORMING SHEET METAL WITH AN AIR HAMMER

It occurred to me while watching a workman pound out a copper sheet in this way that an ordinary pneumatic riveter, if fitted with a simple socket so as to hold a wooden block, or mallet head, could be used for the purpose.

This was quickly rigged up and a test made by taking one of the spinning chucks, fastening the sheet over it, the sheet being held down by bolts at the edge, and by using the pneumatic riveter with the wooden head it was found that the metal could be easily forced into the chuck. This method may be old, but it was new to the writer, and seemed to open up a new way of embossing, or raising, sheet metal, especially copper, without the necessity of having expensive tools.

After making up quite a number of tank heads from tinned copper in this way, we found that those which had been raised by the pneumatic-hammer process were much smoother and more perfect than those which had been spun, because there were no abrasions of the surface and no spinning marks. For raising sheet metal to regular shapes this would seem to offer a promising field.

EDITORIALS

Separate Development from Production in Airplane Work

THE acknowledged reports regarding aircraft production show very clearly the necessity for separating development and production. There can be no doubt as to our needing all the available new ideas or that we should have the full benefit of all the engineering knowledge and experience, but we should not let this interfere in any way with the production of the best planes we know of until we can devise better ones. It is this constant changing, due to mixing development and production, which has interfered so seriously with our airplane and other programs.

* * *

Those who have followed the development work of the Aircraft Board have been impressed with the lack of practical experience on the part of some of its members, as evidenced by their efforts to "improve" types of machines which are quite satisfactory on the other side, instead of securing production first and making improvements afterward. Improvements are of course always in order, but they should not delay the production of machines which are serviceable though not perfect.

* * *

The War Committee of the Technical Societies has been trying for months to have the many engineers among the members utilized for war work, but so far without any very marked success. This mass of engineering ability must be utilized if we are to secure the best results to do our utmost in carrying on the war to a successful conclusion. The sum of all the engineering ability of the country is greater than that which any small committee can possibly have.

* * *

The value of development can hardly be overestimated. It should receive more attention than has so far been the case in this country. We are now in the war game and have not learned to concentrate the technical brains of the country on war problems as has been the case in Germany. The sooner we follow suit in this respect the better we shall utilize our many resources.

* * *

The greatest difficulty, however, is to prevent interference with production, and this can only be done by a man at the head who thoroughly understands the necessity for so doing. We believe John D. Ryan is such a man and that we shall soon see research and development kept separate from all productive work. We believe that he will demand much more comprehensive and practical research and development than has yet been secured, that more engineers will be called to aid in this work and that we may look for much more comprehensive results than have been secured.

Reconstruction and Readjustment Being Taken Up

ALTHOUGH nothing should be done that will in any way affect our preparation for carrying on the war in the most vigorous manner possible, it is pleasing to note that the authorities in Washington are taking up the matter of reconstruction and readjustment, and that there is likely to be a thoroughly representative committee for the handling of this important work. Director Gifford of the Council of National Defense informs us that the council has been studying this subject for some time with a view to the coördination of present and prospective Government activities, and also with the view of acting as the central agency for this work. The council, composed as it is of six of the cabinet officers, has voted to recommend to President Wilson that the council be created a reconstruction and readjustment agency at once, utilizing the present organization, and to include such an expansion as may be necessary to successfully carry on the work.

* * *

It is also believed that Secretary Baker is urging this action upon the President in behalf of the five fellow cabinet members, and that the President will in all probability issue an executive order to this effect. As soon as this is finally approved, new and enlarged committees of the council will be formed to carry on this work. It is quite probable that the publication of the paper by Secretary Lane, extracts of which will appear in these columns, has been hastened by this action of the council.

With the various vital industries adequately represented on such a committee, and we are assured that this will be the case, there is no question as to much good being accomplished, and the sooner the work is begun the better for all concerned. Needless to say, the machine-building industry is sure to be well represented on such a committee, and there is every opportunity for much good as a result both with regard to industry in this country and our relations to the rest of the world after the war.

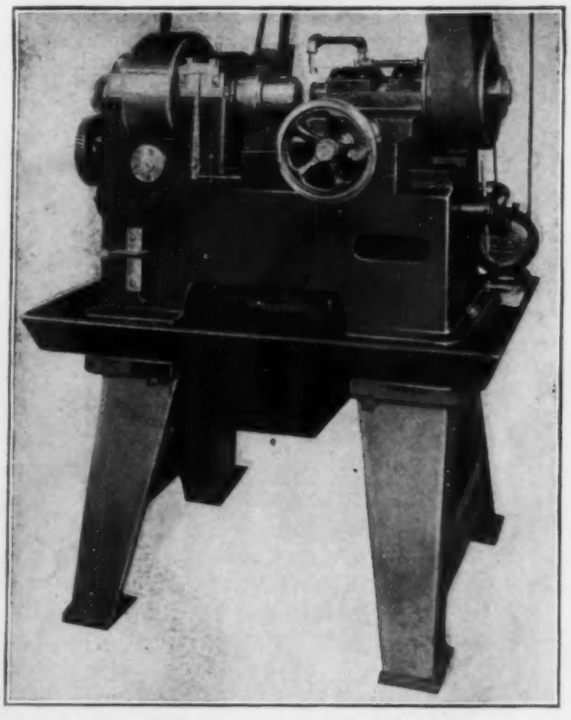
Save More and Buy Stamps

THE progress of the war demands constant and increasing sacrifices. We are sending our young manhood to represent us on foreign battlefields where they are called upon to sacrifice not only their personal comfort and material interest but their lives as well. It is therefore appropriate for us who remain at home in safety and comfort to perform our sacred obligations to support these gallant men by working and saving in order that they may have food, clothing, arms and ammunition. Buy war-saving stamps to the utmost of your financial capacity and then increase your capacity by saving more.

This department is open to all new equipment of interest to shop owners. Photographs and data should be addressed to Editorial Department, "American Machinist"

Woods Thread-Milling Machine

The illustration shows a small thread-milling machine that has been placed on the market by the Woods Engineering Co., Alliance, Ohio, for milling the threads on

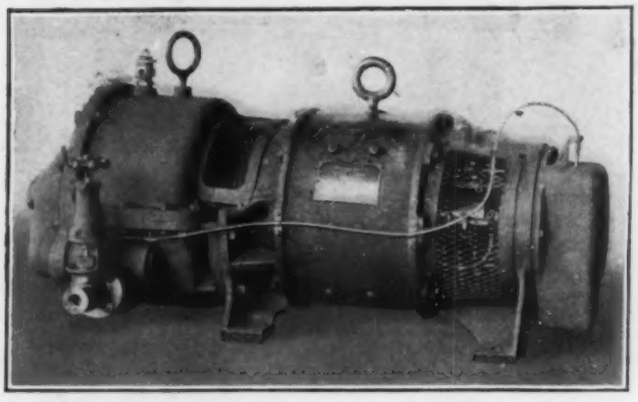


WOODS THREAD-MILLING MACHINE

shell plugs. While particularly designed for this special work the machine may be used for other classes of commercial chucking work. The plugs for which it was especially designed are of 1- and 2-in. diameter, the former being threaded for a length of ½ in., and the latter for a distance of 1¼ in.

Westinghouse Direct-Current Turbo-Generator Set

The Westinghouse Electric and Manufacturing Co. has recently brought out the small direct-current turbo-generator set shown in the illustration. This set is at present made in two sizes, 8.5 kw. and 10 kw. capacity, the latter being of such construction that a temporary load of 12.5 kw. may be carried. The sets will operate on pressures varying from 80 to 235 lb. at the inlet and from 0 to 10 lb. back pressure. The machines are constructed as simply as possible, but have many of the features found desirable in larger units. Among these are hand- and automatic-throttle control and an emergency overspeed governor. This latter feature is placed on the generator end of the unit and automatically closes the throttle valve of the turbine when overspeed occurs. The device consists of a



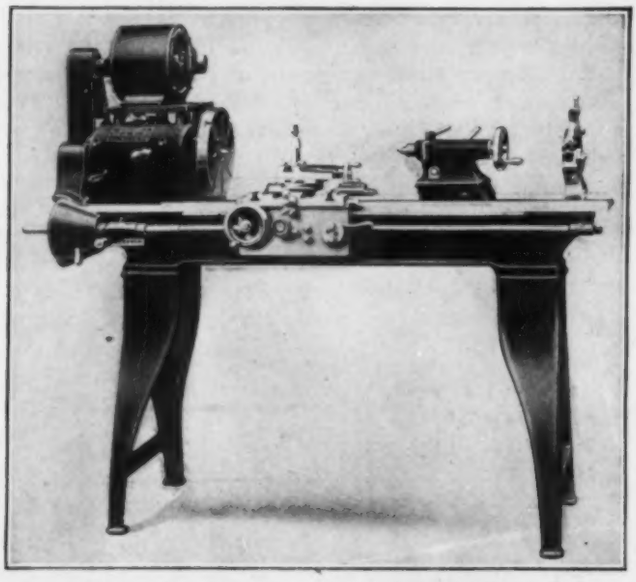
WESTINGHOUSE 10-KW. DIRECT-CURRENT TURBO-GENERATOR SET

small weight placed in the shaft of the unit, which at a predetermined speed engages a trip lever connected to the throttle, the operation of this lever stopping the unit.

There is but one revolving element composing the generator, the shaft being extended so that it carries the turbine rotor. It is claimed that this construction not only makes a very compact machine, but eliminates all coupling and misalignment troubles and dispenses with turbine bearings and packings. The turbine rotors are made of open-hearth steel forgings, in the periphery of which are placed blades of electric-furnace steel held in place by pins. The blades are of the impulse type, and although there is only one row the reversing chamber causes the steam to pass through the blades a second time, thus allowing complete expansion. The generator is fitted with self-aligning ball bearings and all open places on the units are covered with expanded metal which protects the machines from foreign matter. The dimensions of the 10-kw. set are 3 ft. 8½ in. long, 23 in. wide and 18¾ in. high.

Shepard 12-In., Geared-Head, Semi-Quick-Change Lathe

The Shepard Lathe Co., Canal and Jackson Sts., Cincinnati, Ohio, has recently placed on the market an improved form of its 12-in., geared-head, semi-quick-change, screw-cutting engine lathe which may be equipped for various styles of drive, including motor, with the motor mounted either on the rear leg or on top of the headstock, and also countershaft and single-pulley drive. The lathe is claimed to contain all the advantages of the complete-quick-change lathe, and the various feeds may be changed or reversed without stopping or shifting belts. When threading, the lead-screw nut remains in constant engagement, making it unnecessary to reverse belts or watch a dial. The spindle speeds are six in number, range from 32 to 502 r.p.m. and are engaged by means of a seven-jaw steel clutch. Phosphor-bronze bearings are used for the spindle in

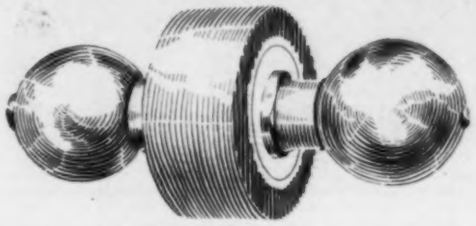


SHEPARD 12-IN. ALL-GEARED LATHE

which draw-in attachments and collets may be used. The tailstock is of the offset type with set-over for turning tapers. The machine can be furnished in either bench or floor type, and equipment includes compound and steady rests, faceplate, guards and wrenches, while extras such as milling attachment, taper-turning attachment, turret, draw-in collets and transposition gears for metric threads may be furnished. The face of the headstock gears is $\frac{15}{16}$ in. and the diameter of the hole through the spindle is 1 in. The weight of the machine is from 800 to 900 lb., depending upon the length of bed.

"Metcalf" Emery-Wheel Dresser

Baldwin, Tuthill & Bolton, Grand Rapids, Mich., are now marketing the "Metcalf" emery-wheel dresser shown in the illustration. This device consists of two heavy knobs on the ends of a short shaft, with an abrasive wheel of special grade and grit mounted on a sleeve between them. The knobs are of iron to give the device weight and are held in the two hands while the dresser is pressed against the wheel to be trued. The device may be used on wheels up to 14 x 1 in. The principles claimed for this device in truing a wheel are, first, the inertia due to the weight of the iron balls; second, the cutting effect of one abrasive wheel on another when held at an angle of from 30 to 40 deg. to the horizontal; and third, the gyroscopic action set up by

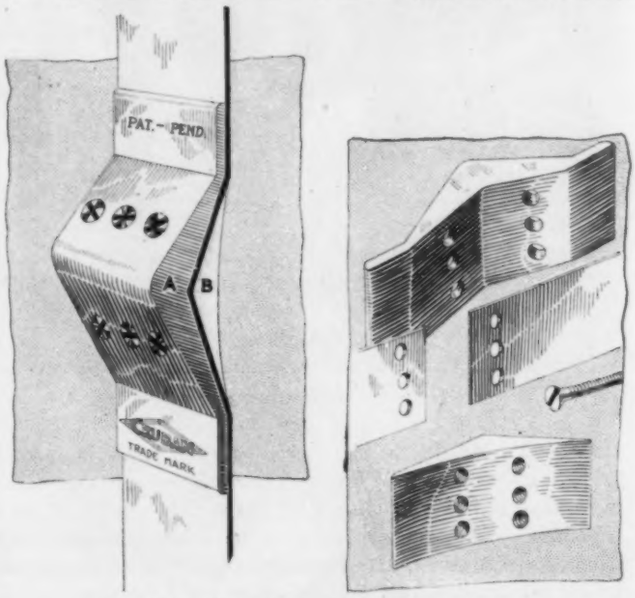


"METCALF" EMERY-WHEEL DRESSER

the rapid rotation of the wheel on its axis. These features, it is claimed, make its operation very rapid and also permit it to bring up a sharp corner on thin or delicate wheels. The device when held about horizontal gives a coarse, open face to the wheel, while a fine, close-grained face for finishing work is secured by holding the dresser nearly vertical. It is also claimed that the device is useful to supplement the work of a diamond dresser on large, coarse, snagging wheels when a smooth grinding surface is desired.

Cruban Coupling for Steel Belts

A band-steel belt is very efficient and costs less than a leather one. A serious objection to its use has been the difficulty of coupling or joining the ends. An ingenious coupling has recently been brought out by the Cruban Machine and Steel Corporation, 2 Rector

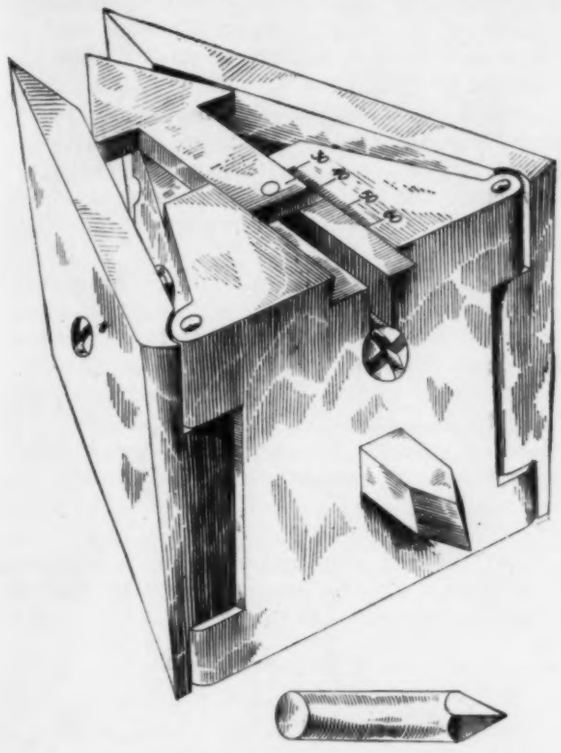


CRUBAN COUPLING FOR STEEL BELTS.

St., New York. The coupling as here illustrated is cut from bars of specially drawn steel which may be cut off in lengths to suit any width of belt. In use the ends of the belt have holes drilled or punched in them to match the screw holes in the coupling and are thus firmly clamped between the parts *A* and *B*. The part *B* has its inner surface curved to the radius of the pulley on which the belt is to run.

Lafayette Tool-Grinding Jig

The device shown is made by the Lafayette Tool Works, 176 Worth St., New York City. It is intended to hold tool bits, such as thread cutters, engraving cutters, routers and the like, so that accurate surfaces or

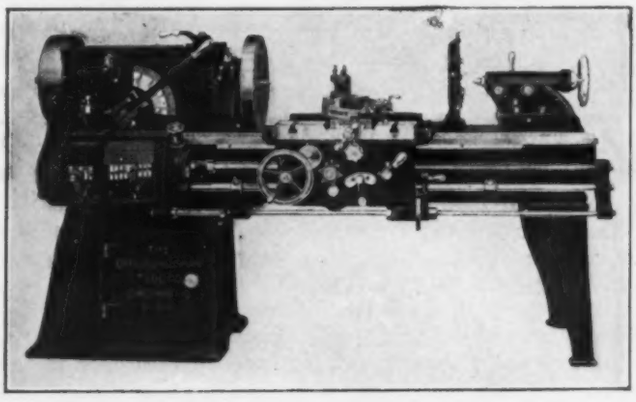


GRINDING JIG FOR TOOLBITS

angles may be ground on them. It is especially desirable for threading tools. The sides, or wings, of the jig are hinged so that the angle to which the tool is to be ground may be easily obtained, graduations indicating the angle which may be from 60 to 29 deg. The angle desired is given to the wings by adjusting the arrow-shaped slide in the center and also a locking screw in each wing. The center slide is graduated to indicate the angle which certain positions will give to the wings on each side. The device will take all regular sizes of tool bits and may be used on any grinding machine fitted with a table or a magnetic chuck.

Greaves-Klusman Geared-Head Single-Lever-Control Lathes

The illustration shows one of the line of geared-head, single-lever-control engine lathes manufactured by the Greaves-Klusman Co., Cincinnati, Ohio. A number of changes have recently been incorporated in these machines which are now manufactured in 16-, 18-, 20-, 24- and 30-in. sizes. The drive pulley has been raised and set in closer to the housing, and certain of the speed-change drive gears formerly returned to neutral position by means of a spring are now returned by a positive-throw lever. The position of the control lever has also been changed so that it was within easier reach of the operator. The overhang on the back of the gear housing is supported by special brackets. All gears in the head are of chrome-nickel steel hardened and heat-treated with bores ground concentric with the pitch circle. All shafts are hardened and heat-treated and lubrication is by means of splash oiling, a sight indicator being placed on the front of the headstock. Apron control of the start, stop and reverse of the spindle is provided, the speeds being in geometric progression. The ratio of direct speeds to those obtained through back gears is the same as the correct ratio between finishing and roughing speeds, so that it is simply necessary to shift one lever to change from one type of work to the other on a given piece. Any one of the 10 speeds can be obtained without stopping, and while the tool is cutting, by means of a single lever. The spindle is of high-carbon, crucible steel and runs in alloy bronze boxes lubricated by sight-feed oilers. The end thrust is taken by the rear housing through alternate bronze and hardened-steel collars. Power is transmitted to the spindle through gears located directly back of the front spindle bearing and only such gears as are required are in mesh. The spindle has a double-sized nose; the smaller diameter, being ground to a standard size, acts as a pilot for the chuck or faceplate, while the larger diameter is threaded. The main drive pulley is mounted on ball bearings on a stationary hub, which also serves as a journal for the main drive shaft. This feature removes the belt strain from the drive shaft. The frictions for forward and reverse movement are adjusted by means of a socket wrench, it being unnecessary to remove the guard, pulley or any other part of the ma-



GREAVES-KLUSMAN GEARED-HEAD LATHE

Made in five sizes, 16 in. by 6 ft., 18 in. by 6 ft., 20 in. by 8 ft., 24 in. by 10 ft., and 30 in. by 10 ft., the dimensions of the 20 in. by 8 ft. size being as follows: Swing over bed, 22¼ in.; swing over carriage, 14¼ in.; distance between centers with tailstock flush, 46 in.; distance between centers with tailstock extended, 51 in.; front spindle bearing, 4¼ x 6¾ in.; rear spindle bearing, 3¼ x 4¾ in.; diameter of hole through spindle, 1⅞ in.; friction-drive pulley, 16 x 5¼ in.; spindle speeds, 8.5 to 300 r.p.m.; diameter of spindle nose, 4¼ in., with pilot 3 in. in diameter, 1¾ in. long; threads cut, 1 to 56, including 11½; range of feeds, 6 to 336; taper of centers, No. 4 Morse; tailstock spindle, 2⅛ x 18½ in.; travel of tailstock spindle, 10 in.; length of carriage, 31 in.; width of bridge, 9 in.; travel of compound rest, 7 in.; size of tools, ⅞ x 1¼ in.

chine. The drive shaft transmits the power through gears to a driven shaft having a cone of five gears. The power is then transmitted to a second driven shaft having a cone of three sliding gears which engage with three of the cone gears on the first driven shaft. On the end of the three sliding gears a stepped clutch is formed, and by sliding these three cone gears along the shaft they connect with a spring-tensioned cone of two gears with a stepped clutch. When in this position the two cones are clutched together and give power to the

fourth and fifth cone gears on the second driven shaft, and by sliding these five gears still further along, the fifth gear is engaged, thus making five direct speed changes and five additional changes through the back gears. The machines may be arranged for line-shaft drive or for motor drive as desired.

The Government's Labor Policy

The conference of employment managers at Rochester on May 9, 10 and 11 developed one thing of vital importance to our future industries in the United States, and that was the claim of a definite labor policy by the Government in regard to war industries. While of course it is only talked of in this connection it does not require a great deal of imagination to picture its spread to all industries and its continuance after the close of the war.

The policy consists of three main principles:

First—Collective bargaining.

Second—The establishment of a maximum and a minimum wage scale throughout the whole country, based presumably on the cost of living.

Third—The abolition of all agencies and methods for the employment of labor, except those established by the Government under central control.

Leaving the merits of the first and second of these questions to those better qualified to discuss them the third should be given the thought and discussion its importance warrants. Its object primarily is to do away with the present methods of destructive labor recruiting (for which the Government is responsible by reason of the cost-plus contract system), and while almost anything is justifiable that will produce that result let us also make sure while there is yet time that the remedy proposed be not worse than the disease.

Theoretically the idea is right, and if it can be worked out under ideal conditions it is probably the answer to a lot of our troubles. However, it is with its practical working out that we must concern ourselves; too many theoretical propositions have been put forward lately with little of practical value to recommend them.

The Policy of the Exchange

There are a number of questions in reference to the policy of the exchange. Everything must be decided in advance as to just what is to be settled by the agency and what by the employer. How is the agency to select and allot men to the various industries in its district? Is the applicant's previous experience or preference to be considered? Is the size of the concern and the urgency of its needs to be the deciding factor, and how and what should decide this? Presuming that man after man sent to a particular factory is unsatisfactory, and therefore returned to the agency, how long is the agency to be compelled to continue sending men? What safeguards have been placed around the selection to insure all industries receiving fair and equal treatment in regard to the number and quality of men supplied to them? What restriction will be placed upon the securing of men by the plant itself? It is understood that advertising will not be allowed; that sending out scouts for labor recruiting throughout the country will be taboo, and rightly so. Recruiting by employees among their friends would be difficult to detect or to stop, and if a house organ is printed how can you restrict its circulation? Are factories to be allowed to employ applicants who come to their gates unsolicited, as is done in England?

The reasons for settling all of these points in advance can readily be shown. Take, for instance, the simplest case—that of a town in which there are only two factories, A and B, making the same stuff, same grade, same size, same equipment and supplied by one United States labor agency. Let us assume that for some reason A consistently gets better men and more of them than B. This would mean annihilation in a very short time for B, and it would mean that the man in charge of the employment agency in a district could become an autocrat with powers almost of life and death.

In the case outlined above it might be possible to check his moves and motives, but when one considers the average industrial town, with factories of all sizes, classes and conditions, who can say, except the man who has charge of the agency, whether his motive for sending to or withholding men from a certain plant is right or wrong? The first point, therefore, to be safeguarded is the manner of selecting the type of man to manage these agencies. Who is to select him, and how? What will determine the term and tenure of his office? In turn, what protection will he have against efforts to oust him by powerful political factions in case he does not truckle to them?

The Workman's Side

On the other hand, what recourse would a workman have who comes under the ban of the district labor agency for either real or fancied reasons? It would seem to me that in adopting this policy we are laying the foundation for what may develop into a better state of industrial relationship than ever before known or conversely into the most despicable autocracy that has ever disgraced the world. Which it will be depends wholly upon the character of the men selected to administer the agencies, and unless exceptional men can be induced by a lively appreciation of their social obligations to volunteer for this work at a financial sacrifice the whole scheme will fail. The man who accepts this work must be willing to forego personal aggrandizement and be content with the honor conferred upon him and the thought of the service he is rendering. No man could be too big for the job, and if men of the character of Nathan Straus or Charles Schwab could be persuaded to take hold of it success could be assured.

Work for the Blind

To relieve the labor shortage the Westinghouse Electric and Manufacturing Co., East Pittsburgh, Penn., is having the coils for some of its electrical apparatus wound with insulating tape by blind workers. This practice was inaugurated last fall, and at the present time seven persons are engaged in finishing the coils. It is stated that the results are satsfactory, so far as quality is concerned, although naturally, on account of the newness of the work, it is not performed as rapidly as it would be by those who have not been deprived of their eyesight. It is expected that this obstacle will be overcome as the workers become more proficient.

No Compulsory Metric System for Great Britain

The final report of the Committee on Commercial and Industrial Policy After the War, presented to Parliament by command of His Majesty and recently made public, seems to sound the death knell of the metric system so far as Great Britain and her colonies are concerned.

Chapter 10 of this report, and it should be noted that this is labeled as a final report, is devoted to weights and measures, and opens with the following:

In view of the extent to which public attention has recently been directed to proposals for the reform of British Weights and Measures we have thought it right to give very careful consideration to the subject, and we have obtained evidence and information thereon, both orally and in writing, from a number of scientific, commercial and official witnesses. Numerous suggestions for the alteration in various degrees of our existing weights and measures have been made to us, but we do not propose to discuss these in detail. The only practical proposal apart from minor changes which can be said to command an organized body of support is that of the Decimal Association for the compulsory adoption of the metric system in this country, and we shall confine our observations mainly to this.

This change has been strongly urged upon us from various quarters, but it cannot be said that there is any such general agreement of opinion in its favor among those who have studied the subject as would justify its adoption.

FINAL CONCLUSION

Having given very full consideration to the subject we are unable to recommend the compulsory adoption of the metric system in this country. We proceed to give a brief history of the movement in favor of that system in the United Kingdom and to state the reasons which have led to the foregoing conclusion.

Omitting the various arguments in the case, we quote a few paragraphs which bear directly on the conclusion of this committee.

In our opinion it is absolutely certain that the anticipated uniformity could not be attained for a very long period if ever.

There is further the serious objection that if we induce the above-mentioned countries (the self-governing dominions and India, the United States and Russia) to change over to the metric system we should be surrendering to Germany the advantage which our manufacturers now enjoy over hers both in their markets and in our own, particularly as for some years to come we should have to manufacture on both systems, while Germany would be enabled to manufacture on one uniform system for the German market and nearly the whole of her export trade.

Lancashire witnesses are emphatically of the opinion that the metric system is unsuitable for cotton manufacture, and they point to the fact that in metric countries it has to be modified for this purpose. We are informed that even in France, which has made the metric system nominally compulsory for more than half a century, the pouce (or inch) is used in textile manufacturing, and that numerous local measures still survive.

In referring to these considerations we have to point out that there is no unanimity even as to the theoretical merits of the metric system as compared with our own. The practical argument that its adoption is desirable in order to secure uniformity in the market of the world has been shown to be unfounded.

To attempt to make the use of the system universal and obligatory would cause great loss and confusion at a particularly inopportune moment for the sake of distant and doubtful advantages. We are convinced that so far from assisting in the reëstablishment of British trade after the war such a measure would seriously hamper it.

As regards the educational advantages claimed for the change, we have been referred to a statement by the Select Committee of 1895 that no less than one year's school time would be saved if the metric system were taught in place of that now in use. The information which we have received does not support that statement, and even if it were well founded it must be remembered that for at least a generation children would have to learn both the new and the old measures and how to convert from one to the other.

It is often popularly supposed that the introduction of the metric system would render possible the immediate sweeping away of many complicated and varying weights and measures. As we have already indicated, this is, in our opinion, wholly fallacious.

Our weights and measures are capable of detailed improvements, but we are not convinced that the metric system is upon the whole theoretically superior to the British system, and we are satisfied that the practical objections to the proposed change are such as decisively to outweigh any advantages which are claimed for it.

A list of the committee follows. It is also interesting to note that while there was some difference of opinion on some of the subjects considered, the decision regarding the metric system was unanimous.

Balfour of Burleigh (Chairman)
Arthur Balfour
Henry Birchenough
Alfred Booth
Colwyn
Faringdon
H. Gosling
C. S. Henry
C. G. Hyde
W. S. McCormick
Alexander McDowell
Gerard A. Muntz
Adam Nimmo
Charles A. Parsons
William Pearce
Arthur F. Pease
W. E. B. Priestley
J. A. Roxburgh
G. Scoby Smith

Percy Ashley
G. C. Upcott
Secretaries

The recent annual meeting of the National Association of Manufacturers voted against the adoption of the metric system and indorsed the work of the American Institute of Weights and Measures in this connection.

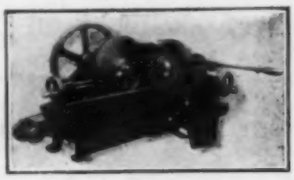
Women Employees of the Packard Motor Car Company

The manner in which Detroit employers are meeting the question of female labor is illustrated by the Packard Motor Car Co., which employs between 10,000 and 12,000 hands, and is engaged largely in the production of trucks and airplane engines for the Government. More than 1000 of the men of this company were called into service, and as a result the officials have introduced into the plant large numbers of women workers. At present they are being used at the inspecting bench and on drilling and milling machines. Somewhere in the neighborhood of 550 of them are at work in the shop. They wear special uniforms of khaki with caps that protect their hair. Their skirts may be divided and turned into bloomers. A school has been established by the Packard company for the training of women in factory work. D. G. Stanbrough, general superintendent, has planned a course which is administered by W. J. Hammond, formerly foreman of the truck-gear department. In the school women first become associated with the men workers of the factory and become accustomed to the noise of factory operations. There the aptitude of a woman for a certain line of work is determined and she is put at what she can do best in the factory and will like best.

Condensed-Clipping Index of Equipment

Clip, paste on 3 x 5-in. cards and file as desired

Grinding Machine for Circular Knives
Machinery Co. of America, Grand Rapids, Mich.
"American Machinist," June 13, 1918

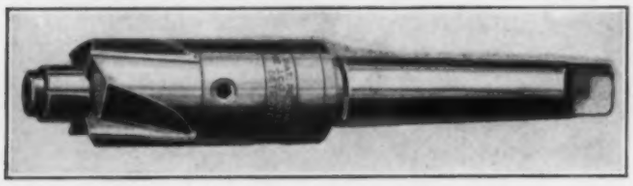


This machine is suitable for sharpening the circular cutters or knives used for cutting meat, paper, cloth or other similar substances. The feeds and adjustments are hand operated and the machine is equipped with a water tank, the grinding being done wet in order to prevent heating. An adjustable back rest of fiber is mounted behind the cutter at a point opposite the grinding wheel to support the cutter rigidly and prevent vibration. The angle of the bevel ground is adjustable. Capacity, 3- to 20-in. knives; diameter of tight and loose pulleys, 4 in.; width of belt, 2 in.; diameter of grinding wheel, 8 in.; width of grinding wheel, $\frac{1}{2}$ to $\frac{3}{4}$ in.; floor space, 30 x 36 in.; height, 20 in.; width of zone ground, up to $1\frac{1}{2}$ in.; weight crated, 275 lb.

Grinding Machine for Slitting Saws, Automatic No. 10
Machinery Co. of America, Grand Rapids, Mich.
"American Machinist," June 13, 1918

An automatic grinding machine for sharpening slitting or milling saws from 2 to 10 in. in diameter and particularly adapted to reclaiming thin slitting saws with fine tooth spacings. It is claimed that the grinding of the teeth is uniform and that the teeth are correctly spaced. The device is fully automatic in operation and is mounted on a pedestal that brings it up to a convenient height for the operator. All essential working parts are inclosed in the body and protected from dust, dirt or other foreign material. All moving parts are provided with adjustment for taking up wear, and any standard shape or spacing of tooth may be obtained by handwheel adjustments. The approximate shipping weight is about 225 lb.

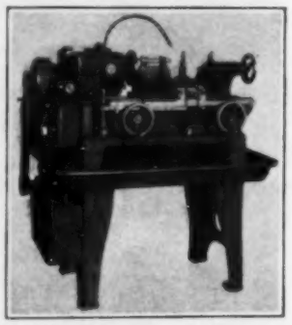
Counterboring and Spot-Facing Tools, "Utility"
J. C. Glenzer Co., Detroit, Mich.



"American Machinist," June 13, 1918

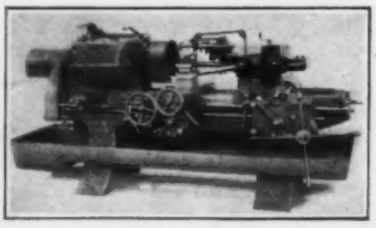
Made up of four parts—the holder, the cutter, the pilot bushing and the pilot pin. The holders are made in four sizes, which cover a range of work from $\frac{7}{8}$ to 3 in. They are provided with Morse taper shanks varying in size from No. 1 to No. 4. The cutters are made of high-speed steel and are provided with a slot across their upper surface which insures a positive drive. The interchangeable pilot bushings are pack hardened and ground 0.008 in. under the drill-hole sizes and are driven by the teeth of the cutter which fit into notches in the upper surface. The pilot pin simply serves to hold the assembled tool together

Lathe, "Sundstrand" 9-In. Manufacturing
Rockford Tool Co., Harrison Ave. and 11th St., Rockford, Ill.
"American Machinist," June 13, 1918



This machine is primarily a plain, high-power lathe for the production of duplicate parts. The headstock is of the all-geared type and the principal bearings are self-aligning SKF. Swing over bed, $9\frac{1}{4}$ in.; swing over plain rest, 7 in.; distance between centers, 12 in.; diameter of hole through spindle, $1\frac{1}{8}$ in.; largest collet capacity, 1 in.; spindle nose, $2\frac{1}{4}$ in. diameter, 10 thread; taper of centers, Morse No. 2; size of cutting tool, $\frac{5}{8}$ x $1\frac{1}{2}$ in.; length of carriage on bed, 18 in.; diameter of drive pulley, $8\frac{1}{2}$ in.; width of drive belt, $2\frac{1}{2}$ in.; speed of drive pulley, 350 r.p.m.; number of spindle speeds, 12; number of feeds, 4; floor space, 45 x 24 in.; weight, crated, 1050 lb.

Lathe, Turret, No. 2-B
Foster Machine Co., Elkhart, Ind.
"American Machinist," June 13, 1918

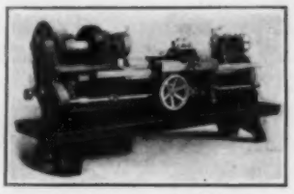


Capacity, bar work up to $3\frac{1}{4}$ in. in diameter and 30 in. in length and chucking work up to 13 in. in diameter; capacity for light chucking work, up to 20 in. diameter; speed changes twelve, 12 to 325 r.p.m.; width of belt, 4 in.; diameter of driving pulley, 15 in.; speed of pulley for high-speed cutting tool, 500 r.p.m.; speed of pulley for stellite cutting tools, 750 r.p.m.; longitudinal feeds, twelve, 0.0055 to 0.150 in. per spindle revolution; cross-feeds, twelve, 0.0029 to 0.080 in. per spindle revolution; weight, complete with automatic chuck and bar feed, but without standard tools, 5200 lb.

Drilling Machine, High-Speed Sensitive
A. C. Mason Co., Inc., Paterson, N. J.
"American Machinist," June 13, 1918

This machine is manufactured in the bench type with single or multiple spindles as desired. Unit construction has been used to permit accessibility, ease of adjustment and replacement in case of wear. Ball bearings are used throughout and speed changes may be made without stopping, two belt speeds being arranged for. The belt drives horizontally from a plain pulley at the rear to a cone pulley on the spindle, a spring idler being incorporated. The rear vertical shaft is inclosed and driven by a two-speed gear drive making four speeds the total available, these being arranged in geometrical progression from 3000 to 10,000 r.p.m.

Lathe, Shell
Fulton Machine Co., Chicago, Ill., Manufacturers Dale-Brewster Machinery Co., Chicago, Ill., Sales Agents
"American Machinist," June 20, 1918



Swing over bed, $20\frac{3}{4}$ in.; swing over tool slide, 9 in.; front spindle bearing, $4\frac{1}{2}$ x 8 in.; rear spindle bearing, 3 x 6 in.; taper in spindle, Morse No. 5; thread on spindle nose, 4 U. S. S., $3\frac{1}{4}$ in. in diameter; headstock pulley, $6\frac{1}{2}$ x 8 in.; gear ratio in headstock, 14.86 to 1; headstock gears, $2\frac{1}{4}$ in. face 5 pitch and $2\frac{1}{4}$ in. face 3 pitch; diameter of feed rod, $1\frac{1}{4}$ in.; feeds of carriage per spindle revolution, 0.124, 0.0989, 0.0783, 0.06125, 0.045, 0.037 and 0.029 in., one feed furnished per machine; width of standard carriage, 31 in.; width of turret carriage, 30 in.; turret, 20 in. across flats, $7\frac{1}{4}$ in. high; tool hole in turret, $3\frac{1}{2}$ in. diameter; length of bed on standard lathe, 8 ft.; length of bed for turret lathe, 10 ft.; diameter of tailstock spindle, $3\frac{1}{2}$ in.; distance between centers with 8 ft. bed, 36 in.

Torch, Portable Brazing "Bantam"
Tyler Manufacturing Co., 64 Pearl St., Boston, Mass.
"American Machinist," June 20, 1918

The outfit is designed to be connected to ordinary gas-supply pipes and electric sockets and can be readily carried from place to place about the shop where welding or heating is required. The air for the forced draft is supplied by a motor-driven blower. The motor is of the universal type and will operate on either direct or alternate current. The gas supply should be of $\frac{1}{4}$-in. pipe size and the outlet should have a $\frac{1}{16}$-in. hole. The torch will develop a temperature with illuminating gas as fuel of 2300 deg. F., and the motor will supply air sufficient to operate four burners like the one supplied

Patent Applied For

Personals

C. H. Overkamp, Pacific Coast manager of Manning, Maxwell & Moore, Inc., is visiting the company's offices in New York.

H. T. J. Porter, industrial engineer, 200 5th Ave., New York, is visiting the plants of the Hercules Powder Co. throughout the Middle West to the Pacific Coast for the purpose of instituting such methods as may better labor conditions and increase efficiency in production.

A. Niedermeyer, for many years connected with the Worthington Pump and Machinery Corporation, most recently as works manager of the Snow-Holly Works of that corporation, at Buffalo, N. Y., resigned recently to devote his entire time to enterprises of his own.

E. Francis McCrossin has withdrawn from the firm of McCrossin & Darrah, representatives of the Link-Belt Co. in Alabama, to devote his time to engineering work. **John F. Darrah,** previously joint representative with Mr. McCrossin, will represent the Link-Belt Co. singly.

Walter W. Nowak, special representative of the Niles-Bement-Pond Co., 111 Broadway, New York, who has been appointed manager of its London office, 25 Victoria Street, S.W., succeeding **W. S. Accles,** deceased, sails this week to assume his new duties. He represented the company in Chile a few years ago.

William W. Coleman, president of the Bucyrus Co., South Milwaukee, Wis., has accepted an appointment from Maj. Gen. C. C. Williams, Acting Chief of Ordnance, U. S. A., to aid a group of expert advisers of the Ordnance Department in bringing the manufacture of guns, carriages and munitions to the highest rate of production possible.

Junius F. Cook was recently named by Secretary of Agriculture Houston to aid in the administration of farm-implement rules. Mr. Cook has been a practical farmer in the United States and a mechanical engineer in this country, England and South America. He is a member of the American Society of Mechanical Engineers.

Dwight P. Robinson and **John W. Hallowell** have retired from the firm of Stone & Webster Engineering Corporation, Boston, Mass. Mr. Robinson has been with this corporation since 1893, has been president since 1908, and has been a member of the firm since 1912. Mr. Hallowell has been with the corporation since 1901 and a member of the firm since 1912. Since May, 1917, he has been a member of the United States Food Administration and expects to continue in that work for the duration of the war.

Business Items

The Molle Typewriter Co., Oshkosh, Wis., has completed the installation of machinery and will begin the production of machines in the near future.

The Bertolette Machine Tool Co., Jersey City, N. J., has established offices at 359 West Side Ave., Jersey City, but the machine shop and warehouse will remain at 220-228 Orient Avenue.

The Sullivan Machinery Co.'s Boston office has been moved from 185 Devonshire St. to Room 516, Boston Safe Deposit and Trust Co.'s Building, 201 Devonshire St. George E. Wolcott is the New England sales manager.

Joseph Beal & Co., dealers in new and used machinery for the metal trade, have opened a new main office and display room at 23-25 Purchase St., near High, Boston, Mass. This company has a branch at 453-457 Atlantic Ave. for transmission and light machinery.

Trade Catalogs

Forging and Heating Furnaces. W. S. Rockwell Co., 50 Church St. (Hudson Terminal Building), New York. Bulletin No. 34. Pp. 8; 8½ x 11 in. A number of illustrations are given showing furnaces of the economizer shield type for different kinds of heat-treating work. A description of design, operation, construction, fuel and sizes is given.

Machine Tools. Greenfield Tap and Die Corporation, Machine Tool Division, Greenfield, Mass. Catalog No. 39. Pp. 162; 6 x 9 in. This catalog illustrates and describes, gives specifications, etc., of lathes, screw machines, grinding machines, cutting-off machines, saw and cutter sharpeners, milling machines, threading machines, etc. It covers all the lines formerly manufactured by Wiley & Russell, Reece Brothers, Wells Brothers Co., Nutter & Barnes Co., F. E. Wells & Son Co., Automatic Machinery Co., A. J. Smart Manufacturing Co., and Bickford Machine Co. A price list is also given for handy reference showing page number, machine number, description, etc.

Steam Engines. Ingersoll-Rand Co., 11 Broadway, New York. Form 883A; single-page leaflet, 8½ in. x 11 in. on class "FP" steam engines, horizontal center-crank type with piston valves.

Ball Bearing Adjustable Drill Head. Nelson-Blanck Manufacturing Co., Detroit, Mich. Two circulars, 4 pp. and 2 pp. illustrating and describing the Buhr patent two-spindle, adjustable, all-ball-bearing drill head with detachable center spindle to drill two or three holes in a line and the Nelson two-spindle adjustable drill head for drilling two holes.

Indicating and Recording Pyrometers. Brown Instrument Co., Philadelphia, Penn. Catalog No. 11. Pp. 80; 8 x 10½ in. It describes and illustrates various kinds of pyrometers for pressure testing, switchboards, thermo couples, thermometers, etc. Several pages of users of the Brown pyrometers for various kinds of work are included. Some illustrations of construction are also given.

Duplex Typeless Die Sinker. Jackson Machine Tool Co., Jackson, Mich. Catalog. Pp. 24; 9 x 12 in. Several illustrations of the machine are given, together with a number of line drawings and diagrams of installation. Specimens of die blocks made on the No. 10 Jackson duplex typeless die sinkers are also shown. Specifications and provisions for export shipments are included.

"Lea" Lead-Testing Machine. C. H. Tracey Co., sales agents, 161 Summer St., Boston, Mass. Circular, 9 x 12 in. It illustrates and describes the "Lea" lead-testing machine manufactured by the West & Dodge Co.

Safety Solderless Electrical Connectors. Cruban Machine and Steel Corporation, 2 Rector St., New York. Booklet. Pp. 8; 4 x 8½ in. Illustrating and describing the solderless wire terminal, the service box lug, the 45-deg.-angle connector, right-angle lugs, two and three way connectors, etc.

Obituary

Hugh Hannan, head of the Hannan-Finton Co., machinist and machinery dealer, died at his home in Springfield, Mass., June 17. He went to Springfield about 51 years ago and shortly after started to learn the machinist's trade and had been engaged in that line of business ever since.

New Publications

Standard Cotton Mill Practice and Equipment—Published by the National Association of Cotton Manufacturers, Boston, Mass. Ninety-six pages, 6 x 9 in.; price $1.50.

This is believed to be the first volume of the kind published by an association of employers, and while it is distributed to the members of the association it contains enough useful information for the practical mill man to make it a book of reference for him. There is also information regarding the equipping of a cotton mill, the use of various kinds of power, has statistical tables relating to raw cotton and a section devoted to technical tables used in the cotton-mill industry, together with general engineering data. It also contains the Buyers' Index at the end.

Experimental Shop Laboratory References—Published by the University of Pennsylvania, Philadelphia, Penn. Four hundred 6 x 9 in. pages.

This is a volume in which the student can make his own notes and by which he is referred to sources of information on the different subjects involved. These references include standard technical periodicals and also technical publications of repute. In this connection it is interesting to note that reference is made to 23 different volumes of the "American Machinist," to the "American Machinist Handbook," and other publications of a similar character. It is a convenient volume for students' notes and should be of much value to engineering students.

Bookkeeping and Cost Accounting for Factories—By William Kent. Two hundred and sixty-one 8¼ x 10¾-in. pages, profusely illustrated with forms. Published by John Wiley & Sons, New York. Price $4.

The author says in his preface: "The time has arrived when there is a need for a systematic treatise on cost accounting which will start the student at the beginning with the elementary principles of double-entry bookkeeping and lead him through factory accounting to cost accounting, giving him not only the fundamental theory in accordance with the views of the ablest accountants, but also warning him against the time-worn fallacies of the older school. Such a treatise the author has undertaken to prepare." Incidentally it may be mentioned that the author was a bookkeeper for a number of years before he became an engineer, and many times during his career as an engineer and as manager of works he has had occasion to install systems of bookkeeping and cost accounting and to audit books. In this way, and by reading much of the extensive literature on accounting, he has kept in touch for over 40 years with the development of accounting practice. The first chapter treats of the elementary principles of bookkeeping, then follow chapters on titles and definitions of accounts; the evolution of bookkeeping—the column ledger; accounts for retail merchants, selling prices, turnover, the Federal Trade Commission's system; factory accounting, separation of factory from general books; cost of accounting, factory cost, starting a cost system, factory orders, subdivisions of the payroll, time keeping, stores accounts, cost keeping by pieces of paper; cost finding methods, use of the job tickets; distribution of burden; depreciation, inventory valuation, appraisals; systems and red tape, fundamentals of a cost system; daily and monthly records, charting of statistics, cost of idleness; problems and difficulties, standard cost; uses of costs, various opinions about costs; classification, symbols, bookkeeping by machinery; old-school accounting, ironworks bookkeeping; modern accounting systems for steel works; foundry costs, cost of coal; hardware and factory and machine-shop accounting; costs in a woodworking shop, a bakery, a textile mill and a power plant; costs in a printing shop; reports to stockholders, education of accountant, cost of idleness, miscellaneous forms, bibliography. Then follows a topical index, and index to forms and blanks and an index of authorities quoted.

Forthcoming Meetings

American Society of Mechanical Engineers. Monthly meeting, second Tuesday. Calvin W. Rice, secretary, 29 West 39th St., New York City.

Boston Branch National Metal Trades' Association. Monthly meeting on first Wednesday of each month. Young's Hotel. Donald H. C. Tullock, Jr., secretary. Room 41, 166 Devonshire St., Boston, Mass.

Engineers' Society of Western Pennsylvania. Monthly meeting, third Tuesday; section meeting, first Tuesday. Elmer K. Hiles, secretary, Oliver Building, Pittsburgh, Penn.

New England Foundrymen's Association. Regular meeting, second Wednesday of each month. Exchange Club, Boston, Mass. Fred F. Stockwell, 205 Broadway, Cambridgeport, Mass.

Philadelphia Foundrymen's Association. Meetings first Wednesday of each month. Manufacturers' Club, Philadelphia, Penn. Howard Evans, secretary, Pier 45, North Philadelphia, Penn.

Providence Engineering Society. Monthly meeting fourth Wednesday of each month. A. E. Thornley, corresponding secretary, P. O. Box 796, Providence, R. I.

Rochester Society of Technical Draftsmen. Monthly meeting, last Thursday. O. L. Angevine, Jr., secretary, 857 Genesee St., Rochester, N. Y.

Superintendents' and Foremen's Club of Cleveland. Monthly meeting, third Saturday. Philip Frankel, secretary, 310 New England Building, Cleveland, Ohio.

Western Society of Engineers, Chicago, Ill. Regular meetings, first, second, third and fourth Mondays of each month, except July and August. Edgar S. Nethercut, secretary, 1735 Monadnock Block, Chicago, Ill.

Technical League of America. Regular meeting, second Friday of each month. Oscar S. Teale, secretary, 35 Broadway, New York City.

WEEKLY PRICE GUIDE OF

IRON AND STEEL

The Government Schedule of steel prices went into effect Sept. 24. Pig iron was set at $33 per ton; pig iron differentials were announced by the American Iron and Steel Institute on Nov. 3. Washington announced sheet and pipe prices on Nov. 5. Warehouse prices have been revised, as shown, by agreement between the War Industries Board and the warehouses; new schedule in effect Nov. 15. Effective Apr. 1, the price of basic iron was fixed at $32, and standard Bessemer at $35.20 at Valley furnace, prices of other irons remaining the same as last quarter.

PIG IRON—Quotations per ton were current as follows at the points and dates indicated:

	Current	One Month Ago	One Year Ago
No. 2 Southern Foundry, Birmingham	$33.00	$33.00	$47.00
No. 2X, New York	34.40	34.25	52.50
No. 2 Northern Foundry, Chicago	33.00	37.00	55.00
*Bessemer, Pittsburgh	36.60	37.25	57.95
*Basic, Pittsburgh	32.00	33.95	52.00
No. 2X, Philadelphia	34.40	33.75	52.00
*No. 2, Valley	33.00	33.95	52.00
No. 2 Southern Cincinnati	36.90	35.90	49.90
Basic, Eastern Pennsylvania	32.90	33.75	50.00

*Delivered Pittsburgh; f.o.b. Valley, 95 cents less.

STEEL SHAPES—The following base prices per 100 lb. are for structural shapes 3 in. by ¼ in. and larger, and plates ¼ in. and heavier, from jobbers' warehouses at the cities named:

	New York			Cleveland		Chicago	
	Current	One Month Ago	One Year Ago	Current	One Year Ago	Current	One Year Ago
Structural shapes	$4.245	$4.195	$5.25	$4.17	$4.50	$4.27	$5.00
Soft steel bars	4.145	4.095	5.00	4.07	5.00	4.17	4.50
Soft steel bar shapes	4.145	4.095	5.00	4.17	4.50	4.17	4.50
Soft steel bands	4.995	....	....	....	....	....	....
Plates, ¼ to 1 in. thick	4.495	4.445	9.00	4.42	8.00	4.52	8.00

BAR IRON—Prices per 100 lb. at the places named are as follows:

	Current	One Year Ago
Pittsburgh, mill	$3.50	$4.75
Warehouse, New York	4.75	4.75
Warehouse, Cleveland	4.10	4.95
Warehouse, Chicago	4.10	4.50

STEEL SHEETS—The following are the prices in cents per pound from jobbers' warehouse at the cities named:

	Pittsburgh, Mill, in Carloads	New York			Cleveland		Chicago	
		Current	One Month Ago	One Year Ago	Current	One Year Ago	Current	One Year Ago
*No. 28 black	5.00	6.495	6.445	10.00	6.42	9.50	6.52	9.50
*No. 26 black	4.90	6.395	6.345	9.90	6.32	9.40	6.42	9.40
*Nos. 22 and 24 black	4.85	6.345	6.295	9.85	6.27	9.35	6.37	9.35
Nos. 18 and 20 black	4.80	6.295	6.245	9.80	6.22	9.30	6.32	9.30
No. 16 blue annealed	4.45	5.695	5.645	9.70	5.62	9.70	5.72	9.70
No. 14 blue annealed	4.35	5.595	5.545	9.60	5.52	9.60	5.62	9.60
No. 10 blue annealed	4.25	5.495	5.445	9.50	5.42	9.50	5.52	9.50
*No. 28 galvanized	6.25	7.745	7.695	13.00	7.67	11.00	7.77	11.00
*No. 26 galvanized	5.95	7.445	7.395	12.70	7.37	10.70	7.32	10.70
No. 24 galvanized	5.80	7.295	7.245	12.55	7.22	10.55	7.47	10.55

*For painted corrugated sheets add 30c. per 100 lb. for 25 to 28 gage; 25c. for 19 to 24 gages; for galvanized corrugated sheets add 5c., all gages.

COLD DRAWN STEEL SHAFTING—From warehouse to consumers requiring at least 1000 lb. of a size (smaller quantities take the standard extras) the following discounts hold:

	Current	One Year Ago
New York	List plus 13%	List plus 25%
Cleveland	List plus 13%	List plus 10%
Chicago	List plus 13%	List plus 10%

DRILL ROD—Discounts from list price are as follows at the places named:

	Extra	Standard
New York	35%	40%
Cleveland	35%	40%
Chicago	35%	40%

SWEDISH (NORWAY) IRON—The average price per 100 lb., in ton lots, is:

	Current	One Year Ago
New York	$15.50–19	$20.00
Cleveland	20.00	12.30
Chicago	19.00	12.00

In coils an advance of 50c. usually is charged.

Note—Stock very scarce generally.

WELDING MATERIAL (SWEDISH)—Prices are as follows in cents per pound f.o.b. New York, in 100-lb. lots and over:

Welding Wire*		Cast-Iron Welding Rods	
⅜, 11, ⅞, ⅜, ⅞, ⅞	22.10 to 35.00	⅛ by 12 in. long	16.00
No. 8, ⅞ and ⅞, 10		⅛ by 19 in. long	14.00
⅛		⅜ by 19 in. long	12.00
No. 12		½ by 21 in. long	12.00
⅞, No. 14 and ⅞		*Special Welding Wire	
No. 18		⅛	33.00
No. 20		⅞	30.00
Very scarce.		⅛	38.00

MISCELLANEOUS STEEL—The following quotations in cents per pound are from warehouse at the places named:

	New York Current	Cleveland Current	Chicago Current
Tire	4.15	4.07	4.17
Toe calk	5.75	4.57	4.32
Openhearth spring steel (heavy)	7.50	8.00	7.60
Spring steel (light)	11.00	11.25	11.90
Coppered bessemer rods	9.00	8.00	7.07
Hoop steel	4.99½	4.75	5.02
Cold-rolled strip steel	8.50	8.25	8.57
Floor plates	6.24½	6.00	7.07

PIPE—The following discounts are for carload lots f.o.b. Pittsburgh; basing card of Nov. 6, 1917, for steel pipe and for iron pipe:

BUTT WELD

Steel			Iron		
Inches	Black	Galvanized	Inches	Black	Galvanized
⅛, ¼ and ⅜	44%	17%	¾ to 1¼	33%	17%
½	48%	33⅓%			
¾ to 3	51%	37½%			

LAP WELD

2	44%	31⅓%	2	26%	12%
2½ to 6	47%	34½%	2½ to 4	28%	15%
			4½ to 6	28%	15%

BUTT WELD, EXTRA STRONG PLAIN ENDS

⅛, ¼ and ⅜	40%	22½%	¾ to 1½	33%	18%
½	45%	32½%			
¾ to 1½	49%	36½%			

LAP WELD, EXTRA STRONG PLAIN ENDS

2	42%	30½%	2	27%	14%
2½ to 4	45%	33½%	2½ to 4	29%	17%
4½ to 6	44%	32½%	4½ to 6	28%	16%

Stock discounts in cities named are as follows:

	New York		Cleveland		Chicago	
	Black	Galvanized	Black	Galvanized	Black	Galvanized
⅜ to 3 in. steel butt welded	33%	16%	43%	28%	41.9%	26.9%
3½ to 3 in. steel lap welded	15%	+3%	39%	25%	37.9%	23.9%

Malleable fittings, Class B and C, from New York stock sell at list price. Cast iron, standard sizes, 10 and 5%.

METALS

MISCELLANEOUS METALS—Present and past New York quotations in cents per pound, in carload lots:

	Current	One Month Ago	One Year Ago
Copper, electrolytic	26.00*	23.50	30.00
Tin, in 5-ton lots	92.00	91.00	62.00
Lead	7.82½	7.25	11.50
Spelter	8.62½	7.50	9.25

*Government price.

ST. LOUIS

Lead	7.75	7.10	9.25
Spelter	37.50	7.25	12.00

At the places named, the following prices in cents per pound prevail, for 1 ton or more:

	New York			Cleveland		Chicago	
	Current	One Month Ago	One Year Ago	Current	One Year Ago	Current	One Year Ago
Copper sheets, base	36.25	32.00	42.00	35.50	42.00	33.50	42.00
Copper wire (carload lots)	31.00	32.00	47.50	36.50	46.00	33.00	47.00
Brass Sheets	31.75	30.75	39.13	35.50	39.50	31.50	39.37
Brass pipe base	36.50	35.50	45.00	40.00	38.00	41.50	43.00
Solder ½ and ½ (case lots)	70.00	62.00	39.50	62.00	39.00	70.00	39.00

Note:—Solder very scarce.

Copper sheets quoted above hot rolled 16 oz., cold rolled 14 oz. and heavier, add 1c.; polished takes 1c. per sq.ft. extra for 20-in. widths and under; over 20 in., 2c.

BRASS RODS—The following quotations are for large lots, mill, 100 lb. and over, warehouse; 25% to be added to mill prices for extras; 50% to be added to warehouse price for extras:

	Current	One Year Ago
Mill	$26.25	$42.00
New York	27.25	45.50
Cleveland	30.00	38.00
Chicago	29.50	42.50

ZINC SHEETS—The following prices in cents per pound prevail:

Carload lots f.o.b. mill 15.00

	In Casks		Broken Lots	
	Current	One Year Ago	Current	One Year Ago
Cleveland	18.75	21.00	18.40	21.50
New York	16.50	23.00	17.00	23.25
Chicago	22.00	22.50	21.50	23.50

ANTIMONY—Chinese and Japanese brands in cents per pound, in ton lots, for spot delivery, duty paid:

	Current	One Year Ago
New York	14.50-15	19.00
Chicago	13.50	21.00
Cleveland	16.00	19.50

There is an apparent discrepancy at this point.

The pages are either missing or the pagination is incorrect.

The filming is recorded as the book is found in the collections.

SHOP MATERIALS AND SUPPLIES

OLD METALS—The following are the dealers' purchasing prices in cents per pound:

	New York Current 1918	New York One Yr. Ago	Cleveland Current 1918	Cleveland One Yr. Ago	Chicago
Copper, heavy and crucible	22.00	28.50	29.00	27.00	22.75
Copper, heavy and wire...	21.00	27.50	28.00	29.00	22.00
Copper, light and bottoms	19.00	25.50	24.00	25.00	20.75
Lead, heavy	6.25	10.00	7.00	10.25	7.50
Lead, tea	5.00	8.75	5.50	8.25	6.50
Brass, heavy	14.00	18.00	18.00	18.50	23.00
Brass, light	10.50	14.00	14.00	14.75	12.00
No. 1 yellow brass turnings	12.50	18.00	19.00	17.75	13.00
Zinc	5.25	7.25	6.50	6.75	6.25

ALUMINUM—The following prices are from warehouse at places named:

	New York	Cleveland	Chicago
No. 1 aluminum, guaranteed over 99% pure, in ingots for remelting (ton lots) per lb.	32.20c.	32.20c.	33½c.

This is the Government price for lots of from 1 to 14 tons.

COPPER BARS from warehouse sell as follows in cents per pound, for ton lots and over:

	Current	One Year Ago
New York	42.00	41.00
Chicago	38.00	41.00
Cleveland	36.50	41.00

BABBIT METAL—Warehouse price per pound:

	New York Current	New York One Year Ago	Cleveland Current	Cleveland One Year Ago	Chicago Current	Chicago One Year Ago
Best grade	125.00	70.00	108 00	70.00	100.00	70.00
Commercial	70.00	40.00	23.00	24.50	24.00	30.00

SHOP SUPPLIES

NUTS—From warehouse at the places named, on fair-sized orders, the following amount is deducted from list:

	New York Current	New York One Year Ago	Cleveland Current	Cleveland One Year Ago	Chicago Current	Chicago One Year Ago
Hot pressed square	$2.50*	List	$1.40	$1.65	$1.05	$3.00
Hot pressed hexagon	2.50*	List	1.20	1.50	.85	3.00
Cold punched square	2.50*	List	.75	1.40	1.00	1.75
Cold punched hexagon	2.50*	List	.75	1.40	1.00	2.25

* List plus.

Semifinished nuts sell at the following discounts from list price:

	Current	One Year Ago
New York	40%	50%
Chicago	50%	50%
Cleveland	60%	50%

MACHINE BOLTS—Warehouse discounts in the following cities:

	New York	Cleveland	Chicago
⅝ by 4 in. and smaller	30%	46%	37%
Larger and longer up to 1 in. by 30 in.	15%	40%	25—5%

WASHERS—From warehouses at the places named the following amount is deducted from list price:

For wrought-iron washers:
New York ..... $2.50 Cleveland ..... $3.00 Chicago $2.50

For cast-iron washers the base price per 100 lb. is as follows:
New York ..... $5.00 Cleveland ..... $4.00 Chicago $3.50

CARRIAGE BOLTS—From warehouses at the places named the following discounts from list are in effect:

	New York	Cleveland	Chicago
⅝ by 4 in. and smaller	30%	46%	37%
Larger and longer up to 1 in. by 30 in.	15%	40%	25—5%

COPPER RIVETS AND BURS sell at the following rate from warehouse:

	Rivets Current	Rivets One Year Ago	Burs Current	Burs One Year Ago
Cleveland	List plus 10%	List plus 10%	List plus 10%	List plus 10%
Chicago	List price	List price	List plus 20%	List price
New York	20% from list	10-2½% from list	List plus 20%	10-2½% from list

RIVETS—The following quotations are allowed for fair-sized orders from warehouse:

	New York	Cleveland	Chicago
Steel ⅛ and smaller	30%	45—5%	45%*
Tinned	30%	45—5%	45%*

Button heads, ¾, ⅞, 1 in. diameter by 2 in. to 5 in. sell as follows per 100 lb.
New York..$6.14½ Cleveland..$5.15 Chicago..$5.67 Pittsburgh..$4.65

Coneheads, same sizes:
New York..$6.24½ Cleveland..$5.25 Chicago..$5.77 Pittsburgh..$4.75

MISCELLANEOUS

SEAMLESS DRAWN TUBING—The base price in cents per pound from warehouse in 100-lb. lots is as follows:

	New York	Cleveland	Chicago
Copper	46.00	42.50	39.50
Brass	40.00	40.00	44.00

For immediate stock shipment 3c. is usually added. The prices of course vary with the quantity purchased. For lots of less than 100 lb. but not less than 75 lb., the advance is 1c.; for lots of less than 75 lb. but not less than 50 lb., the advance is 2½c. over base (100-lb. lots); for less than 50 lb. but not less than 25 lb., 5c. should be added to the base price; and for quantities under 25 lb. the increase above base is 10c.

TIN PLATES—Warehouse prices per box:

Coke tin plate, 14 x 20:

	Cleveland Current	Cleveland One Yr. Ago	Chicago Current	Chicago One Yr. Ago
100 lb.	$10.00	$12.00	$10.57	$11.60
I. C. 107 lb.	10.15	12.17	10.65	11.75

Terne plate, 20 x 28:

Base Weight	Net Weight	Coating				
100 lb.	200	3	18.95	18.70	19.07	16.50
I. C.	214	8	19.25	19.00	19.37	16.85
I. C.	270	8	21.75	21.50	21.37	18.95
I. C.	218	12	21.75	19.85	12.57	17.85
I. C.	221	15	22.50	20.35	22.07	18.10
I. C.	226	30	23.25	21.75	22.57	19.15
I. C.	231	25	24.50	22.20	23.07	19.90
I. C.	236	30	25.75	23.50	23.57	20.85
I. C.	241	35	26.75	24.50	25.07	21.80
I. C.	246	40	28.00	25.75	25.57	23.15

NOTE—New York prices furnished on application to dealers. Price varies according to whether the plates are wanted for work essential to the war or for nonessential work.

COTTON WASTE—The following prices are in cents per pound:

	New York Current	New York One Year Ago	Cleveland	Chicago
White	11.00 to 13.00	13.00	16.50	12.00 to 16.50
Colored mixed	8.50 to 12.00	10.00	13.00	11.50 to 14.00

WIPING CLOTHS—Jobbers' price per 1000 is as follows:

	13¼ x 13¼	13¼ x 20½
Cleveland	52.00	58.00
Chicago	48.00	50.00

SAL SODA sells as follows per 100 lb.:

	Current	One Month Ago	One Year Ago
New York	$1.75	$1.75	$1.75
Philadelphia	1.75	1.75	1.75
Cleveland	2.40	2.35	2.10
Chicago	4.65	4.00	3.00

ROLL SULPHUR in 360-lb. bbl sells as follows per 100 lb.:

	Current	One Month Ago	One Year Ago
New York	$4.30	$4.30	$2.85
Cleveland	4.50	4.50	3.50
Chicago	4.00	4.00	3.00

COKE—The following are prices per net ton at ovens, Connellsville, and cover the past four weeks:

	July 3	June 27	June 20	June 13
Prompt furnace	$5.00	$6.00	$6.00	$6.00
Prompt foundry	7.00	7.00	7.00	7.00

FIRE CLAY—The following prices prevail:

	Current
Chicago, 450-lb. bbl.	$2.50
Cleveland, 375-lb. bag	2.50

LINSEED OIL—These prices are per gallon:

	New York Current	New York One Year Ago	Cleveland Current	Cleveland One Year Ago	Chicago Current	Chicago One Yr. Ago
Raw in barrels	$1.65	$1.26	$1.80	$1.28	$1.72	$1.29
5-gal. cans	1.75	1.36	1.95	1.38	1.92	1.34

WHITE AND RED LEAD in 500-lb. lots sell as follows in cents per pound:

	Red Current Dry	Red Current In Oil	Red 1 Year Ago Dry	Red 1 Year Ago In Oil	White Current Dry and In Oil	White 1 Year Ago Dry and In Oil
25 and 50-lb. kegs	12.38	12.83	13.25	13.50	12.38	13.00
12½-lb. keg	12.60	13.05	13.50	13.50	12.60	13.25
100-lb. keg	12.15	12.60	13.75	14.00	12.15	13.50
5-lb. cans	13.95	.....	15.25	15.50	13.95	15.50
1-lb. cans	14.85	.....	.....	.....	14.85	.....

NEW *and* ENLARGED SHOPS

Consult the Buying Section when in need of machinery or supplies

WASHINGTON, D. C.

The Navy aims to give information regarding its purchases to all manufacturers known to be in a position to supply its demand. Owing to the need of prompt action in the cases of all machine tools hereinafter listed, the Navy cannot arrange to permit a postponement of the opening of bids if the manufacturers are able to secure bidding forms and submit their bids prior to date fixed for opening.

In case time does not permit this, it will be appreciated if any manufacturer not receiving information directly regarding these purchases will notify the Purchasing Division, Bureau of Supplies & Accounts, Navy Department, Washington, D. C., in order that the firm's name may be properly listed for all future purchases.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, for furnishing machines and machine tools as follows:

July 12, 1 braiding machine, Schedule No. 4843½, delivery, Navy Yard, Boston, Mass.

Lathes, Schedule No. 4854½, delivery, Philadelphia, Penn.

One knife grinding machine, Schedule No. 4855½, delivery, Navy Yard, Wash., D. C.

Saw filing and setting machines, Schedule No. 4857½, delivery, Wash., D. C.

Motor generator sets, Schedule No. 4867½, delivery, Pensacola, Fla.

Machine tools, Schedule No. 4813½, delivery, Philadelphia, Penn.

Sawing and joining machine, Schedule No. 4815½, delivery, Hampton Roads, Va.

July 15, electric grinders, Schedule No. 4882½, Navy Yard, Wash., D. C.

Machinists' vises, Schedule No. 4880½, delivery, Navy Yard, Philadelphia, Penn.

Bolt heading machine, Schedule No. 4839½, delivery Iona Island, N. Y.

Shaper machine, Schedule No. 4846½, delivery, Philadelphia, Penn.

Oil tanks, f. o. b., Schedule No. 4895½.

July 19, motors, Schedule No. 4919½, delivery, Wash., D. C.

Planners, Schedule No. 4921½, delivery, Rockaway Beach, N. Y.

Motors, Schedule No. 4923½, delivery, Rochester, N. Y.

Machine tools, Schedule No. 4931½, delivery, Boston, Mass.

1 bolt heading machine, Schedule No. 4839½, delivery Navy Yard, Brooklyn, N. Y.

1 braiding machine, Schedule No. 4843½, delivery Navy Yard, Boston, Mass.

1 pipe threading machine, Schedule No. 4844½, delivery Navy Yard, Charleston, S. C.

Bids were received by the Bureau of Supplies and Accounts, Navy Department, for furnishing machines and machine tools as follows:

(Item 1)—1 motor-driven, cylinder grinding machine, Class 434, Schedule No. 4720½, delivery, Navy Yard, Boston, Mass., from Heald Machine Co., Barber's Crossing, Worcester, Mass., $2,940; Henry Prentiss & Co., Inc., Box 866, New York City, $2,145.

(Item 1)—2 heavy duty milling machines, Class 436, Schedule No. 4725½, delivery, Navy Yard, Charleston, S. C., from Cincinnati Milling Machine Co., Marlburg Ave. and South St., Cincinnati, Ohio, $4,230; Fairbanks Co., Colorado Bldg., Washington, D. C., $3,749; Manning, Maxwell & Moore, Inc., 119 West 40th St., New York City, $3,616.

(Item 1)—1 motor-driven, plain, horizontal grinders; Class 135, Schedule No. 4752½, delivery, Charleston, S. C., from Kemp Machine Co., 223 North Calvert St., Baltimore, Md., $12,733; Landis Tool Co., Waynesboro, Penn., $8,500.

(Item 2)—1 interval grinding machine, Class 141, Schedule No. 4758½, delivery, Washington, D. C., from Bryant Chucking Grinder Co., $1,350; Heald Machinery Co., Barber's Crossing, Worcester, Mass., $2,915; D. Nast Machine Co., Bourse Bldg., Philadelphia, Penn., $2,318, alternate, $2,395, alternate, $2,315.

(Item 1)—1 motor-driven, power forcing press; Class 146, Schedule No. 4762½, delivery, Washington, D. C., from Lucas Machine Tool Co., Waynesboro, Penn., $1,750; Sterrett & Stoer Co., Inc., Finance Bldg., Philadelphia, Penn., $2,687, alternate, $1,877.

(Item 1)—1 14-in., drive shaper, with constant speed motor; Class 149, Schedule No. 4755½, from Manning, Maxwell & Moore, Inc., 119 West 40th St., New York City, $2,086; Henry Prentiss Co., Inc., Box 866, New York City, $2,422.

(Item 1)—2 motor-driven, surface grinders, with a 8 x 12 x 22 in. capacity; Class 150, Schedule No. 4766½, from Manning, Maxwell & Moore, 119 West 40th St., New York City, $2,635.

(Item 1)—1 welder, spot capacity to ⅜ in., equipped with motor drive; Class 151, Schedule No. 4767½, from Federal Machine and Welding Co., Philadelphia, Penn., $775; Thompson Spot Welding Co., 161 Pleasant St., Lynn., Mass., $1,807.38.

(Item 1)—2 molding machines, suitable for use of flasks 15 x 15 in., Class 155; (2)—2 Schedule 4726½, molding machines, suitable for use of flasks, 13 x 18 in., Class 155, from Cleveland.—Osborn Manufacturing Co., 5401 Hamilton Ave., N. E., Cleveland, Ohio, $4,658; Labor Manufacturing Co., Philadelphia, Penn., $3,900; Munford Moulding Machine Co., Chicago, Ill., $2,600; Hobard Bros. Co., Troy, Ohio, $2,200.

(Item 3)—1 molding machine for heavy work, Class 156, Schedule No. 4726½, from Cleveland, Osborne Manufacturing Co., 5401 Hamilton Ave., Cleveland, Ohio, $1,964; Grimes Molding Machine Co., Detroit, Mich., $1,550; Heman Pneumatic Machine Co., Pittsburgh, Penn., $1,700; Labor Manufacturing Co., Philadelphia, Penn., $3,600.

(Item 1) 4 back geared, precision lathes, Class 106, Schedule No. 1865, delivery, Navy Yard, Washington, D. C., from D. Nast Machine Co., Bourse Bldg., Philadelphia, Penn., $1,702, alternate, $1,677, alternate, $1,618.

(Item 1)—6 flat, 2 x 24 in., motor-driven, turret lathes, Class 125, Schedule No. 4719½, delivery, Puget Sound, Wash., from Hallidie Machine Co., 908 L. C. Smith Bldg., Seattle, Wash., $2,620; Jones & Lamson Machine Co., $2,425; Manning, Maxwell & Moore, Co. Inc., 119 West 40th St., New York City, $2,645.

(Item 1)—6 screw cutting, motor-driven, lathes, Class 130, Schedule No. 4746½ delivery, Navy Yard, Brooklyn, N. Y., from W. F. Davis Machine Tool Co., Washington, D. C., $2,230; Fairbanks Co., Colorado Bldg., Washington, D. C., $2,128; Kemp Machine Co., 223 North Calvert St., Baltimore, Md., $1,880; Manning, Maxwell & Moore Co., Inc., 119 West 40th St., New York City, $2,488; Monarch Machine Tool Co., Sidney, Ohio, $2,018; D. Nast Machine Co., Bourse Bldg., Philadelphia, Penn., $2,680; Niles, Bement Pond Co., 111 Bway, New York City, $2,735, alternate, $2,210; Phillips Smith Manufacturing Co., Sidney, Ohio, $1,914; Van Dyke Churchhill Co., 529 Singer Bldg., New York City, $2,602, alternate, $2,531.

(Item 1)—5 universal milling machines, Class 148, from Becker Milling Machine Co., Hyde Park, Mass., $3,742; Brown & Sharp Manufacturing Co., Providence, R. I., $2,280; Fairbanks Co., Colorado Bldg, Washington, D. C., $3,446; Kemp Machinery Co., 223 North Calvert St., Baltimore, Md., $3,746.

(Item 2)—5 universal milling machines, Class 154, Schedule No. 4764½, delivery Navy Yard, Washington, D. C., from Bethlehem Steel Co., South Bethlehem, Penn., $1,234; W. E. Tuttle, Jr., receiver for C. & C. Electric Manufacturing Co., Garwood, N. J., $2,650.

(Item 1)—1 motor-driven, geared head, toolmakers, screw cutting, engine lathe; (2)—1 set of tools and an equipment set, Class 161, Schedule No. 4774½, delivery, Newport, R. I., from Fairbanks Co., Colorado Bldg., Washington, D. C., $2,019; Kemp Machinery Co., 223 North Calvert St., Baltimore, Md., $1,772; Manning Maxwell & Moore Co., Inc., 119 West 40th St., New York City, $2,713; Niles-Bement-Pond, 111 Bway, New York City, $1,860, part bid; Henry Prentiss & Co., Inc., Box 866 New York City, $2,099, part bid.

(Item 1)—One 30-ton, four motor, electric traveling crane; Class 175, Schedule No. 4793½, delivery, Washington, D. C., from Alfred Box Co., Philadelphia, Penn., $15,556; Bedford Foundry Machine Co., Bedford, Ind., $16,260; Manning, Maxwell & Moore, Inc., 119 West 40th St., New York City, $16,405; Niles-Bement-Pond, 111 Bway, New York City, $17,000; Pawling & Harrischfeger Co., 38th and National Ave., Milwaukee, Wis., $17,475; Whiting Foundry Equipment Co., Harvey, Ill., $16,270.

(Item 1)—2 complete, self contained type, universal and tool grinding grinders, with motor drive; Class 157, Schedule No. 4770½, delivery, Norfolk, Va., from Aumen Machine Co., 170 East Lombard St., Baltimore, Md., $1,210; Kemp Machinery Co., 223 North Calvert St., Baltimore, Md., $1,825; Manning Maxwell & Moore, Inc., 119 West 40th St., New York City, $684; Woods Engineering Co., 108 Paterson St., Alliance, Ohio, $730.

(Item 1)—One 9 in. sand, pan grinder, with self-dumping device; Class 159, Schedule No. 4772½, delivery Washington, D. C., from American Clay Machinery Co., Bucyrus, Ohio, $4,600, alternate, $4,000; Phillip & McLaren, 24th and Smallman St., Pittsburgh, Penn., $4,700, alternate $5,050.

(Item 1)—4 back geared, double, heavy duty, engine lathes; Class 158, Schedule No. 4771½, delivery, Washington, D. C., from Aumen Machine Co., 107-109 East Lombard St., Baltimore, Md., $5,670, alternate, $5,174, alternate, $5,050; Driggs Manufacturing Co., 50 Whitney Ave., New Haven, Conn., $5,888, alternate, $6,118, alternate, $7,038; Kemp Machinery Co., 223 North Calvert St., Baltimore Md., $4,271.35; Manning, Maxwell & Moore, Inc., 119 West 40th St., New York City, $4,230; Niles-Bement-Pond Co., 111 Bway, New York City, $4,546.25; alternate, $4,221.25; Sherritt & Stoer Co., Inc., 603 Finance Bldg., Philadelphia, Penn., $5,291, alternate, $5,399, alternate, $6,127; Swind Machine Co., Widener Bldg., Philadelphia, Penn., $4,150, alternate, $4,254, alternate, $4,359; Whitcomb, Blaisdell Machine Co., 134 Gold St., Worcester, Mass., $4,030, alternate, $4,134, alternate, $5,550

(Item 1)—One 18-in. single, spindle disc grinder, with self contained motor drive; Class 160, Schedule No. 4773½, delivery, Newport, R. I., from E. A. Benchley, Inc., 6 Portland St., Cambridgeport, Mass., $1,222.75; Stowell Co., South Milwaukee St., Milwaukee, Wis., $864.50.

Wash., D. C.—Bureau of Supplies and Accounts, Navy Department, has awarded the contract for furnishing machines and machine tools as follows:

1 belt-driven, pipe cutting and threading machine; Class 331, Schedule No. 4660½, to Fairbanks Co., Colorado Bldg., Wash., D. C., $669.

Class 339, Schedule No. 4665½, to Hill Pump Co., Anderson, Ind., $1,956.

METAL WORKING

NEW ENGLAND STATES

Conn., Bridgeport—The Bullard Engineering Works, Brewster St. and Fairfield Ave., is in the market for additional equipment for its plant for machining field artillery.

Conn., Bridgeport—The Lake Torpedo Boat Co. has awarded the contract for the construction of two 1-story 40 x 80 ft. and 24 x 24 ft. addition to its plant. The company is also having plans prepared for the construction of a large addition in order to increase its capacity. Noted May 30.

Conn., Hartford—The Board of Water Commissioners has had plans prepared by C. M. Saville, Ch. Engr., for a 2-story, 30 x 130 ft. garage and office building to be erected on Union St.

Conn., Hartford—F. Finkelstein, 11 Central Row, is receiving bids for the construction of a 1-story, 68 x 110 ft. garage. Estimated cost, $20,000. F. C. Walz, 348 Trumbull St., Arch.

Conn., Hartford—Marchetti & D'Avino, Arch., 756 Main St., is receiving bids for the construction of a 2-story, 32 x 56 ft. garage for R. Brancieri, 171 Front St. Estimated cost, $10,000.

Conn., New Britain—The New Britain Machine Co., 140 Chestnut St., is in the market for a 5-ton crane of 25-ft. 6-in. span and a 10-ton crane or 40-ft. span.

Conn., New Britain—The Traut & Hine Manufacturing Co., 910 Stanley St., manufacturers of metal novelties, has awarded the contract for two 1- and 3-story, 44 x 70 ft. and 43 x 83 ft. additions to its factory on Elm St. Estimated cost, $35,000.

Mass., Boston—The Mason Regulator Co., c/o Densmore & LeClear, Engr., 88 Broad St., has awarded the contract for its 3-story, 80 x 160 ft. factory to be erected on Hyde Park Ave. Noted May 30.

Mass., Waltham—W. M. Caldwell, 563 Main St., has awarded the contract for a 1-story, 52 x 130 ft. garage to be erected at 553 Main St. Estimated cost, $10,000.

Mass., Worcester—The Filter Finishing Co., Greendale, has awarded the contract for the erection of a 1-story, 44 x 88 ft. addition to its plant here.

R. I., Providence—The Aberthaw Construction Co., 27 School St., Boston, Mass., will soon start construction work on its shipbuilding plant to be erected here. Noted June 27.

R. I., Providence—The Crompton & Knowles Loom Works, 93 Grand St., Worcester, Mass., is having revised plans prepared by F. A. Dadmun, Engr., 93 Grand St., Worcester, Mass., for a 1-story, 30 x 70 ft. garage and storage, sheds to be erected here. Estimated cost, $10,000. L. J. Knowles, Pres.

MIDDLE ATLANTIC STATES

Md., Baltimore—The Baltimore Tube Co., Wicomico and Ostend St., manufacturer of metal seamless tubes, has purchased a large tract at Wicomico and Bayard St. and plans to build an addition to its plant.

Md., Baltimore—The Bartlett, Hayward Scott and McHenry St., has awarded the contract for a 479 x 618 ft. factory to be erected on Nanticoke St., for the manufacture of munitions. Estimated cost, $10,000.

Md., Baltimore—C. E. Elliott has had plans prepared for a 1-story, 50 x 120 ft. machine shop to be erected on Bayard and Severn St. Noted July 4.

Md., Baltimore—The Fleischman Co. 1413 North Charles St., has awarded the contract for the construction of a 2-story garage. Estimated cost, $40,000. Noted June 20.

Md., Cumberland—The Baltimore & Ohio R. R. Co., Baltimore & Ohio Bldg., Baltimore, has awarded the contract for a locomotive rebuilding plant, here, to include a 200 x 800 ft. brick and steel main building with 3 others of like construction. Estimated cost, $1,500,000.

N. J., Belleville—The Rare Metal Products Co. has acquired the plant of the Seton Chemical Co. on Cortland St., consisting of a 7-acre site fronting on the Erie R. R. and a number of factories, and plans to operate same for the production of antimony and other metal products.

N. J., Bordentown—Fire recently destroyed the boat building plant of H. C. Ford situated along the Delaware River. Loss, $10,000.

N. J., Camden—The New York Shipbuilding Co., c/o E. H. Sapp, B'way. and Fairview St., is building a 71 x 105 ft. forge shop in the east end of the city. Noted June 30.

N. J., Camden—The New York Shipbuilding Co., Bway and Fairview St., is in the market for the following list of cranes: 1 double trolley, 103 ft. span crane with 20-ton trolleys; 8 single trolley, 50 ft. span cranes with 15-ton trolleys; two 42-ft. span, 15-ton cranes; two 42-ft. span, 5-ton cranes, and one 58-ft. span, 15-ton crane.

N. J., Jersey City—The Air Reduction Co., 177 Pacific Ave., manufacturer of oxygen equipment, has awarded the contract for the construction of a 4-story, 40 x 110 ft. foundry. Estimated cost, $40,000. Noted May 30.

N. J., Kayport—The Aeromarine Plane and Motor Co., Locust St., is building a plant.

N. J., Newark—E. and J. Bass, 610 B'way, New York City, manufacturers of silverplated novelties, have acquired a 30 x 125 ft. site here at 114 Commerce St., and plan to build a 3-story plant.

N. J., Newark—The Essex Foundary Co., Murray St., plans to build a 1-story, 75 x 180 ft. factory on Elm St. Estimated cost, $25,000.

N. J., Newark—The United Advertisement Corporation, 27 Treat Place, plans to build a 1-story, 90 x 103 ft. factory at 162 Badger Ave. Estimated cost, $30,000.

N. J., Riverside—The Riverside Metal Co., manufacturer of castings, etc., has increased its capital stock from $500,000 to $1,500,000 and plans to build additions to its plant.

N. Y., Buffalo—The Barcalo Manufacturing Co., manufacturer of iron and brass beds, plans to build a 1-story addition to its plant at 225 Louisiana St. Estimated cost, $6000.

N. Y., Buffalo—The Buffalo Structural Steel Co., Dart St., plans to build a new addition to its plant.

N. Y., Dunkirk—The Atlas Crucible Steel Co., is in the market for a 25-ton, 65 ft. span crane with a 5-ton auxiliary.

N. Y., New York—(Borough of Brooklyn)—E. Behringer, c/o L. Allmendinger, Arch., 20 Palmetto St., is having plans prepared for the erection of a 1- and 2-story, 148 x 250 ft. machine shop to be erected on Flushing and Wyckoff Ave. Estimated cost, $30,000.

N. Y., New York—(Borough of Brooklyn)—E. Cohn, 2129 63rd St., has awarded the contract for the construction of a 1-story, 18 x 24 ft. garage. Etimated cost, $10,000.

N. Y., New York—(Borough of Brooklyn)—The Improved Appliance Co., 455 Kent Ave., manufacturer of gas appliances, has awarded the contract for a 4-story addition to its factory on South 8th St. and Kent Ave. Estimated cost, $15,000. Noted May 9.

N. Y., New York—(Borough of Brooklyn)—F. Ochase, Sterling Pl. east of Washington Ave., has had plans prepared by Koch & Magner, Arch., 26 Court St., for the construction of a 2-story garage. Estimated cost, $11,000.

N. Y., New York—Borough of Brooklyn—The Realty Construction Co., 1422 Pitkin Ave., will build a 1-story, 70 x 80 ft. garage on Atlantic Ave. east of Brooklyn Ave. Estimated cost, $20,000.

N. Y., New York—(Borough of Brooklyn)—I. Schnitzer, 152 Union Ave., is having plans prepared by E. M. Adelsohn, Arch., 1776 Pitkin Ave., for a 1-story, 50 x 99 ft. garage to be erected on Bedford and St. Marks Ave. Estimated cost, $16,000.

N. Y., New York—(Borough of Brooklyn)—The Standard Oil Co., 26 Bway, New York City, has awarded the contract for a 2-story garage and office building to be erected on Kent Ave. and North 10th St. Estimated cost, $12,000.

N. Y., New York—(Borough of Brooklyn)—L. Tickle, Delevan St., has awarded the contract for the construction of a 2-story, 60 x 100 ft. work shop and storage building. Estimated cost, $45,000.

N. Y., New York (Borough of Manhattan)—The American Foundry and Car Co., 165 Bway, is in the market for six 5- and 10-ton cranes.

N. Y., New York—(Borough of Manhattan)—Cuneo & Podesto, 73 Washington Sq., has had plans prepared by F. Vitola, Arch., 56 West 45th St., for the construction of a 5-story, 100 x 129 ft. garage. Estimated cost, $100,000. Noted May 30.

N. Y., New York—(Borough of Manhattan)—J. Katz, 51 Chamber St., plans to build a 4-story, 34 x 92 ft. garage at 325-27 East 9th St. C. B. Meyers, 1 Union Sq., Arch. Estimated cost, $30,000.

N. Y., New York (Borough of Manhattan)—The Nichols Copper Co., 25 Broad St., is in the market for several cranes.

N. Y., New York—(Borough of Manhattan)—The Reliance Steel and Tool Co., 30 Church St., has leased property at 24-26 Murray St. and plans to equip same for its own use.

N. Y., New York (Borough of Manhattan)—The J. Trageser Steam Copper Works, 447 West 26th St., manufacturer of galvanized boilers and copper specialties, has acquired a factory at 459 West 26th St. and plans to equip same for its own use.

N. Y., Niagara Falls—The United States Light and Heat Corporation, manufacturer of lighting equipment and storage batteries, has awarded the contract for a 1-story, 150 x 300 ft. factory to be erected on Highland Ave. Estimated cost, $75,000.

N. Y., Rochester—G. L. Heughes Co., 1029 Lyell Ave., has awarded the contract for the construction of a 1-story, 18 x 160 ft. addition to its iron works. Noted June 20.

N. Y., Syracuse—Taylor & Bonta, Arch., Gurney Bldg., is receiving bids for a 2-story, 60 x 120 ft. factory to be erected on Seneca St. for the Brown, Lipe, Chapin Co., manufacturer of gears. Estimated cost, $35,000.

N. Y., Watertown—P. W. Devendorf, 145 Arsenal St., has had plans prepared by T. P. Phillips, Arch., Rothstock Bldg., for the construction of a 2-story, 80 x 100 ft. addition to his garage. Estimated cost, $40,000.

Penn., Allentown—The H. Sofransey Co., manufacturer of iron and steel goods, plans to build a 2-story, 40 x 185 ft. addition to its plant on Allen St. Estimated cost, $40,000.

Penn., Bradford—Bovaird & Seyfang, Davis St., manufacturer of oil well supplies, etc., has awarded the contract for the construction of a 90 x 100 ft. foundry. Estimated cost, $90,000.

Penn., Lancaster—The Rowe Motor Manufacturing Co. has had plans prepared by M. R. Evans, Arch., East Orange St., for a 1-story, 120 x 200 ft. factory to be erected in the east end of the city. Estimated cost, $60,500.

Penn., Millvale—The E. T. Lippert Saw Co., 608 Lincoln Ave., will soon award the contract for the construction of a 3-story, 35 x 145 ft. addition to its machine shop. Estimated cost, $40,000. Noted July 4.

Penn., Philadelphia—The Bessemer Motor Truck Co., Grove City, has awarded the contract for a 1-story, 90 x 440 ft. factory to be erected at Holmesburg Junction, here.

Penn., Philadelphia—The Philadelphia Ry., Penrose Ferry, West Bridesburg, is building a new 1-story, 60 x 200 ft. shop here. Estimated cost, $30,000.

Penn., Philadelphia—B. C. Simon, 19th St., has awarded the contract for a 1-story, 65 x 135 ft. addition to his machine shop on 23rd St. Estimated cost, $20,000.

SOUTHERN STATES

Ala., Bessemer—Fire recently damaged the plant of the Central Foundry Co. Loss $10,000.

Fla., Sanford—The Atlantic Coast Line R. R., Atlantic Coast Line Bldg., Wilmington, N. C., has purchased an 80-acre site and plans to build shops and terminals. J. E. Willoughby, Ch. Engr.

Ga., Atlanta—The American Peanut Products Co., 65-A West Mitchell St., is in the market for potato-chip machinery.

Ky., Louisville—The Shuler Axle Manufacturing Co., Military Rd. and Wabash R. R., Detroit, Mich., is establishing a branch plant here on Jones and N St.

S. C., Columbia—The Tozer Engine Co., 609 Green St., recently incorporated with $50,000 capital stock, plans to build a plant for the manufacture of steam engines, boilers and general foundry equipment. T. F. Dial, Pres. and Mgr.

Va., Norfolk—The Norfolk Shipbuilding and Dry Dock Co., 494-526 Argyle Ave., has awarded the contract for the construction of two shop buildings.

Va., Richmond—The Richmond Smith-Form-A-Truck Co., 1813 West Broad St., is in the market for equipment with which to build trucks from used cars, including lathes, electric drills, welding outfits, etc. D. D. Armstrong, Mgr.

MIDDLE WEST

Ill., Burr Oak—A. T. Hawk, Arch., c/o owner, is receiving bids for a 1-story roundhouse to be erected here for the Chicago, Rock Island and Pacific Ry., 139 West Van Buren St., Chicago. C. A. Morse Ch. Engr.

Ill., Chicago—Armour & Co., 208 South La Salle St., has awarded the contract for the construction of a 1-story machine shop. Estimated cost, $40,000. Noted Apr. 25.

Ill., Chicago—C. A. Brown is building a 1-story, 75 x 125 ft. plant at 35th St. and Shields Ave. for the manufacture of truck bodies. Noted May 30.

Ill., Chicago—The Conolly Iron Sponge and Governor Co., 22nd and Morgan St., has leased a 4½-acre site on the Canal and California Ave. and plans to build a plant. Estimated cost, $25,000

Ill., Chicago—The Cullman Wheel Co., manufacturer of automobile sprockets, has awarded the contract for a 3-story factory to be erected at 1350-54 Altgeld St. Estimated cost, $40,000.

Ill., Chicago—Fire recently destroyed the plant of the Gilbert Manufacturing Co., 1743-51 North Albany Ave., manufacturer of house screens.

Ill., Chicago—Hardinge Bros., 1770 Bertau Ave., manufacturer of lathes, chucks, etc., is building a 1-story, 40 x 100 ft. factory. Noted May 30.

Ill., Chicago—The H. Pratt Co., 2222 South Halsted St., plans to build a 1-story, 50 x 123 ft. machine shop.

Ill., Chicago—The Simonds Manufacturing Co., 1604 South Western Ave., manufacturer of saws and machine knives, has awarded the contract for a 3-story factory to be erected at 1618 Western Ave., S. Estimated cost, $50,000.

Ill., Chicago—The Symington-Chicago Corporation, 122 South Michigan Ave., has awarded the contract for its munition plant to be erected on 74th and Ashland St., and will include a 250 x 1240 ft. machine shop and 380 x 1200 ft. shell plant,. Estimated cost, between $5,000,000 and $6,000,000.

Ill., Chicago—D. A. Wright, 568 Washington Blvd., has purchased the former plant of the Allis Chalmers Co. on 12th St. and Washtenaw Ave. and plans to equip same for the manufacture of lathes, gunboring and turning lathes and a composite lathe and planer.

Ill., Decatur—The Duel Truck and Tractor Co., has had plans prepared by J. A. Scribbins, Arch., Powers Bldg., for the construction of a 1-story, 150 x 160 ft. factory, office and administration building.

Ill., Monmouth—The Monmouth Plow Co., South Main St., has awarded the contract for the construction of a 5-story, 80 x 90 ft. addition to its plant. Noted Apr. 25.

Ill., Pullman (Chicago P. O.)—The American Steel and Machinery Co. is in the market for equipment for a plant with a daily capacity of 6000 155 mm. shells.

Ind., East Chicago—E. M. Runnell, 617 Washington St., Gary, has had plans prepared by K. D. Norris, Arch., Calumet Bldg., for a 2-story, 112 x 145 ft. Ford salesroom and garage to be erected here. Estimated cost, $15,000.

Ind., Kokomo—The Kokomo Steel and Wire Co. will soon start construction work on its plant for the manufacture of shells for the government. Main building to be 1400 ft. long with a width of 150 ft. for ⅓ of its length and 90 ft. for the other ⅔. Estimated cost, including $2,750,000.

Ind., Richmond—The Pennsylvania Lines west of Pittsburgh has awarded the contract for its car shops, to be erected here. Estimated cost, $125,000. Noted Dec. 13.

Ind., South Bend—The Standard Oil Co., 72 West Adams St., Chicago, is receiving bids for a 1-story, 100 x 300 ft. garage to be erected here. Estimated cost, $50,000. Schlinz & Railey, 53 West Jackson Blvd., Chicago, Engr.

Ind., Speed—The Louisville Cement Co., Speed Bldg., Louisville, Ky., plans to install new machinery for the equipment of its cement mill here.

Mich., Detroit—C. H. Crane, Arch., 2325 Dime Bank Bldg., is receiving bids for the construction of a 2-story, 21 x 82 ft. addition to the factory of the Puritan Machine Co., Lafayette Blvd., and 10th St. A. O. Dunk, Pres. Noted July 4th.

Mich., Grand Rapids—The Wolverine Brass Works, 62 Monroe Ave., will soon award the contract for the construction of a 5-story addition to its factory. Osgood & Osgood, Arch. Noted May 6.

Mich., Muskegon—The Campbell, Wyant and Cannon Foundry Co., Sanford and McKinney Aves., has purchased a site and plans to build an addition to its plant.

Mich., Port Huron—The Port Huron Foundation Co. will soon start construction work on its new mill and shop additions for the construction of revenue cutters and trawlers. Estimated cost, $200,000.

Ohio, Blanchester—The Fullflo Co., Opera Place, Cincinnati, manufacturer of oil pumps, is building several small additions to its plant here and is in the market for additional metal working machinery for the equipment of same.

Ohio, Cincinnati—The Cincinnati Planer Co. has awarded the contract for the construction of a 1-story, 50 x 100 ft. addition to its plant. Noted June 13.

Ohio, Cincinnati—The J. B. Morris Foundry Co., Court and Harriet St., manufacturer of gray iron castings, is building several additions to its plant and is in the market for a sand-blast, cleaning barrel for cleaning castings.

Ohio, Cleveland—The International Steel Tie Co., 16702 Waterloo Rd., plans to build a 1-story, 50 x 220 ft. factory. Estimated cost, between $20,000 and $30,000.

Ohio, Cleveland—The New York Central R. R. Co., St. Clair Ave. and West 3rd St., is having plans prepared for a 1-story, 97 x 263 ft. locomotive repair shop to be erected at 564 East 152nd St. Estimated cost, $150,000. G. C. Cleveland, Ch. Engr.

Ohio, Cleveland—The Western Machine Producing Co., 7209 St. Clair Ave., has awarded the contract for the construction of a 2-story 105 x 122 x 126 ft. addition to its machine shop. Estimated cost, $25,000.

Ohio, Euclid — Bishop-Babcock-Becker, 1303 East 40th St., manufacturer of tacks, nails and brass goods, has acquired a 26-acre site on Bliss Rd. and plans to build a group of factory buildings.

Ohio, Hamilton—The Black & Clawson Co., 2nd and Vine St., manufacturer of paper-making machinery, is building an addition to its plant and is in the market for machine tools, electric motors, and traveling cranes for the equipment of same. Address B. L. Baldwin, 502 Second National Bank Bldg., Cincinnati.

Ohio, Marietta—The United States Government, is having plans prepared for machine shops and other buildings for repairing 24 Ohio River dams in Wheeling district. H. W. Stickle, Wheeling, W. Va., Engr.

Ohio, New Boston—Whitaker Glessiner Co. plans to build a 1-story, wire and nail mill. Estimated cost, $100,000. A. Longfellow in charge.

Ohio, Struthers—The Struthers Furnace Co. plans to build a slag crushing plant and install the necessary machinery for the equipment of same. Estimated cost, $150,000. A. B. Stough, Engr.

Ohio, Wheeling—Fire recently destroyed the plant of the Superior Glass Co. at Martins Ferry, near here. The company engaged in the manufacture of searchlight lenses, for the French Government. Loss, $200,000.

Ohio, Youngstown—The Mahoning Foundry Co. is building a new foundry at Kyles Corners for the manufacture of parts for the Mahoning and Wright hot air furnaces.

Wis., Milwaukee—The Atlas Foundry Co., 39th and Burnham St., has purchased a site and plans to build a gray iron foundry. O. A. Meyer and W. E. Gerlinger, interested.

Wis., Milwaukee—S. F. Kadow, Arch., 988 Kinnickinnie Ave., is receiving bids for the erection of a 110 x 150 ft. garage and machine shop, for A. Dix, 215 Graham St.

Wis., Milwaukee—The Wadhams Oil Co., 359 Clinton St., plans to build a 1-story, 32 x 100 ft., brick, concrete and steel garage and service shop.

Wis., Racine—T. J. P. Wolf, of the Prefix Radiator Co., will receive bids until Aug. 1, for the erection of a 3-story, 125 x 300 ft., brick addition to its factory. Estimated cost, $100,000.

Wis., Superior—F. W. Dort has had plans prepared for the erection of a 66 x 80 ft. foundry. Estimated cost, $6,000.

Wis., Superior—S. A. Riches, 1014 Harrison St., plans to build a foundry. Estimated cost, $3,000.

WEST OF THE MISSISSIPPI

Ark., Conway—The Conway Compress Co. is in the market for machinery with which to equip its plant. Estimated cost, $40,000.

Ark., Little Rock—The Smith Auto Livery Co., 112½ Louisiana Ave., has awarded the contract for the construction of a 80 x 90 ft. garage.

Iowa, Council Bluffs—The Pennsylvania Consumers Oil Co., will build a 2-story, 42 x 60 ft. cooper shop. Estimated cost, $5,000. J. C. Woodward, 1282 Canning St., arch.

Kan., Junction City—The Union Pacific R. R., Omaha, Neb., has awarded the contract for a roundhouse to be erected here.

Ia., Nevada—S. S. Hanson will build a 1-story, 100 x 140 ft. garage. Estimated cost, $12,0,00.

Minn., Minneapolis—The Northwestern Steel Corporation has purchased teh plant of the Franklin Park Foundry Co. and plans to improve and equip same for its own use.

Minn., St. Paul—The Northern Pacific Ry. plans to build a car repair shop. Estimated cost, $250,000. H. L. Stevens, 122 Railroad Bldg., Chr. Engr., O. M. Rognan, 1228 Railroad Bdlg., Arch.

Mo., St. Louis—W. T. Hartwell, 3735 Oxford Ave., has leased a 103 x 213 ft. site on Market and Chestnut St., between 11th and 12th St. and plans to build a public garage. Estimated cost, $40,000.

Mont., Great Falls—The United Products Co. has selected a site and plans to build a cannery.

Okla., Miami—Fire recently destroyed the Darling mill of the Commonwealth Lead and Zinc Co., near here. Loss, $100,000.

Okla., Oklahoma—The Midland Motor Car and Truck Co., 519 Mercantile Bldg., plans to build the second to its plant with a daily capacity of 20 trucks.

Tex., Beaumont—L. J. Wilde, 1055 2nd St., San Diego, Calif., and associates plan to build a steel shipbuilding plant here.

Tex., Fort Worth—G. W. Armstrong & Co., South Hemphill St., is in the market for machinery with which to manufacture oil well supplies.

Tex., Fort Worth—Burney & Tillar, 1202 Burk Burnett Bldg., has awarded the contract for the construction of its 100 x 100 ft. garage. Estimated cost, $25,000.

Tex., McKinney—The McKinney Compress Co., recently incorporated with $50,000 capital stock, is in the market for machinery to equip its newly acquired plant. G. Findberg, Abilene, Pres.

Tex., San Antonio—The Lone Star Truck and Tractor Association has purchased an 18-acre site adjoining the shops of the International & Great Northern Ry. and plans to build a plant, consisiting of 5 units, for the manufacture of motor trucks, trailers and tractors. A. O. Sairis, Dist. Mgr.

Tex., San Juan—F. E. Powell plans to build a garage and automobile repair shop. Estimated cost, $75,000.

Wyo., Cheyenne—The Union Pacific R. R., Omaha, Neb., will soon award the contract for a 1-story, 195 x 210 ft. machine shop to be erected here.

Wyo., Green River—The Union Pacific R. R., Omaha, Neb., has awarded the contract for a round house, machine shop, etc., to be erected here.

WESTERN STATES

Calif., Los Angles—The Eclipse Pulley Covering Co., plans to build a plant.

Calif., Oakland—The Moore Shipbuilding Co. has awarded the contract for additions to its planing mill. Estimated cost, $12,000.

Calif., San Francisco—The Acme Engine Co., 11 Minnesota St., has leased the adjacent premises, formerly occupied by the Metal Weld Co., and is in the market for an Acme turret lathe, a Jones & Lamson lathe and 2 new drill presses, etc.

Minn., Minneapolis—The Northwestern Steel Corporation has purchased the plant of the Franklin Park Foundry Co. and plans to improve and equip same for its own use.

Ore., Portland—The Northwest Process Co. plans to build a number of additions to its plant, to include a 50 x 50 ft. carpenter and machine shop, 50 x 50 brass foundry and a 50 x 50 ft. coppersmith shop. The company also plans to install an overhead crane, forges, hydraulic press and heavy power hammer.

Ore., Portland—The Vaughn Motor Works, 271 Hawthorne Ave., plans to build a 36 x 70 ft. foundry addition to its plant.

Wash., Everett—The Stuvard Machinery Co., recently incorporated with $50,000 capital stock, plans to establish machine shops. A. Nyelin and G. Anderson, 2431 Highland Ave., incorporators.

Wash., Everett—M. H. Tholmes has purchased a site and plans to build a shipbuilding plant and dry dock.

Wash., Everett—The United Steel Co. has awarded the contract for the construction of new shops the main building of which will be 70 x 200 ft.

Wash., Seattle—P. J. Appleton, 1111 1st Ave., has awarded the contract for the erection of a 2-story, 43 x 114 ft., foundry and machine shop at 1410 Dearborn St. Estimated cost, $5,000.

Wash., Seattle—The Erickson Engineering Co. plans to build two 49 x 63 ft. and 60 x 140 ft. additions to its shipbuilding plant. Estimated cost, exclusive of machinery, $10,000.

Wash., Seattle—Skinner and Eddy, 1559 South Railroad St., is in the market for a 12 ft. planer with a 16 ft. table and a 10 ft. boring mill.

Wash., Seattle—The Vulcan Manufacturing Co., 1200 4th St., S., plans to remodel its storage building and convert same into a machine shop. The company will install craneways and considerable machinery.

Wash., Hoquiam—The Lamb Machine Co. is building a plant. Noted June 27.

Wash., Seattle—The Acme Forge Works has had plans prepared for a new machine shop to be erected on Spokane St. and East Marginal Way. Noted June 27.

Wash., Seattle—The Alaska Copper Works, 1041 Railroad Ave., S. will build a 1-story, 50 x 87 ft., machine shop at 3600 East Marginal Way. Estimated cost, $6000.

CANADA

B. C., Vancouver—The Allan & McKelvie Engineering Co., 1214 Pender St., E., galvanizers, plans to build a 40 x 80 ft. plant.

N. B., Campbellton — The McLennan Foundry and Machine Co., Ltd., plans to build a shipbuilding plant at Duncan's Point on the Restigouche River.

N. S., Halifax—The Halifax Shipyards, Ltd., Montreal, Que., is receiving bids for the construction of a large steel shipbuilding plant here. Estimated cost, $3,000,000. J. W. Norcross, 731 Sherbrooke St., Pres. Noted June 20.

N. S., Sydney—The Dominion Iron and Steel Corporation, 112 St. James St., Montreal, Que., plans to build a rolling mill here. Estimated cost, $5,000,000.

Ont., Galt—The Galt Brass Co. has awarded the contract for the construction of an addition to its plant. Noted May 30.

Ont., Hamilton—The Ford-Smith Machine Co., Ltd., Earl St., has awarded the contract for its factory.

Ont., Leaside—The Canadian Northern Railway has awarded the contract for the construction of its new shops here. M. H. MacLeod, Canadian Northern Ry Bldg., Winnipeg, Man., Gen. Mgr. and Ch. Engr.

Ont., Toronto—R. C. Desrochers, Secretary of the Department of Public Works, Ottawa, is receiving bids for the construction of a military garage here.

Ont., Toronto—The Martin Pump and Machine Co., Ltd., 43 Davies Ave., is building an addition to its plant. Estimated cost, $40,000.

Ont., Toronto—Milton & Prentiss, 1504 Traders Bank Bldg., is in the market for a second-hand 10-in. belt driven air compressor for 100 lbs. per sq.in.

Ont., Toronto—The Universal Tool Steel Co., 159 Dufferin St., has awarded the contract for the construction of an addition to its plant. Estimated cost, $45,000. Noted June 27.

Que., Lachine—The Canadian Allis-Chalmers Co., Ltd., Rockfield St., plans to build an addition to its foundry on St. Joseph St. Estimated cost, $20,000.

Que., Montreal—E. Themens, 1271 Guoin Blvd., plans to build a 3-story garage. Estimated cost, $10,000.

Que, Montreal—Caron Bros., 233 Bleury St., manufacturer of jewelry, has awarded the contract for the construction of its 2-story factory. Estimated cost, $100,000.

Que., Shawinigan Falls—The Canadian Ferro-Alloys Co. will soon start construction work on its new plant. Estimated cost, $100,000.

GENERAL MANUFACTURING

NEW ENGLAND STATES

N. H., Nashua—The Nashua Manufacturing Co., manufacturer of cotton flannels, will soon award the contract for the construction of a 2-story, 27 x 129 ft. factory. C. R. Makepeace & Co., Butler Exchange Bldg., Providence, R. I., Arch.

R. I., Newport—The Bureau of Yards and Docks, Navy Dept., Wash., D. C., has awarded the contract for a chemical laboratory to be erected here. Estimated cost, $34,955. C. W. Parks, Ch.

MIDDLE ATLANTIC STATES

Md., Baltimore—Fire recently damaged the plant of the Alexander Milburn Co., 1420-18 West Baltimore St., manufacturer of acteylene appliances.

Md., Baltimore—The M. Vernon Woodberry Mills, Inc., 506 Continental Bldg., has awarded the contract for the erection of a 2- and 4-story, 31x 32 ft. and 12 x 25 ft. cotton duck factory. Estimated cost, $25,000. Noted May 16.

N. J., Bayonne—The Southern Cotton Seed Co., East 22nd St., has awarded the contract for the construction of a factory. Estimated cost, $75,000.

N. J., Burlington—The State Masonic Home has awarded the contract for the construction of a boiler room and cold storage building. Estimated cost, $35,000.

N. J., Kenvil—The Hercules Powder Co. is building several 50 x 195 ft. additions to its plant and will include mixing houses, two silent recovery buildings, etc.

N. J., Mount Union—Fire recently destroyed 4 manufacturing buildings of the local plant of the Aetna Chemical Co., comprising the recovery and purification works. Loss, $500,000.

N. J., Newark—The American Porpoise Lace Co., 267 Mount Pleasant Ave., has purchased a 75x100 ft. site on 16th St. and plans to build a factory.

N. Y., New York (Borough of Brooklyn)—The Gutta Percha Rubber Manufacturing Co., 126 Duane St., is building an addition to its plant on Skillman St.

N. Y. Watertown—A. H. White, Engr., 30 Broad St., New York City, is preparing

plans for rebuilding the sulphite factory of the International Paper Co., Glen Park, here. Noted May 16.

Penn., Bloomsburg—The Frederick Fear Match Co., West and 7th St., has awarded the contract for an 80 x 101 ft. factory. Estimated cost, $75,000. Noted June 6.

Penn., Easton—The Chipman Knitting Mills, West Easton, has had plans prepared by W. Michler, Arch., Drake Bldg., for the construction of a 1- and 2-story 50 x 100 ft. and 60 x 145 ft. factory. Estimated cost, $50,000.

Penn., Lancaster—The Bottenfield Tire Co., Liberty St., plans to build a new addition to its plant. Estimated cost, $20,000.

Penn., Middleburgh—The Liverpool Spinning Mill has purchased the factory adjoining its present plant and plans to equip same for the manufacture of ribbon.

Penn., Philadelphia—T. R. Brown & Son, 2nd and Westmoreland St., has awarded the contract for the construction of its hosiery mill.

Penn., West Reading—Narrow Fabric Co., Wyomissing, has had plans prepared for a 4-story, 22 x 90 ft. factory to be erected here.

Penn., Williamsport—Fire recently destroyed the plant of the Dittmar Furniture Co., Day and Light St. Loss, $75,000.

SOUTHERN STATES

ALA., Sylacauga—J. A. Shinn plans to establish a hoisery knitting mill here.

Fla., Leesburg—W. R. Van Sant and J. C. Sanders plans to build a cotton gin.

Fla., Moore Haven—The Florida Ice and Power Co., Lake Wales, has awarded the contract for the installation of an ice plant and cold storage room.

Ky., Louisville—The W. R. Martin Broom and Mop Co., 1010 South Preston St., plans to double its present capacity and install additional equipment.

La., New Orleans—Fire recently damaged the cooper shop of W. Keegan, 1710 Tchoupitoulas St. Loss, $500.

N. C., Greensboro—The North State Flour Milling Co., Bragg and South Elm St., plans to build a 30 x 50 ft. addition to its mills. Estimated cost, $4,000. J. C. Morris, Mgr.

N. C., Landis—The Corriher Mills Co., manufacturer of hosiery yarn, plans to build a 64 x 75 ft. addition to its mill and install 2,268 spindles and electric drive power equipment. Estimated cost, including equipment, $35,500.

Tenn., Coal Creek—The Magnet Knitting Mills, Clinton, has awarded the contract for a 60 x 200 ft. hosiery mill to be erected here, cost, $20,000. The company plans to install 850 electrically driven knitting machines, to cost, $70,000. Noted July 4

Tenn., Columbia—The Armour Fertilizer Works has purchased the former property of J. Chapman west of the Century mines on McKenon Place and plans to build a plant for mining phosphate. Estimated cost $100,000.

Va., Lynchburg—The Lynchburg Cotton Mill Co. is building a 100 x 100 ft. addition to mill No. 1. Estimated cost, including equipment, $300,000. H. L. Moorman, Pres.

W. Va., Charleston—The Gazette Printing Co., 909 Virginia St., has awarded the contract for the construction of a 3-story, 50 x 90 ft. printing plant. Estimated cost, $45,000.

W. Va., Clarksburg—The National Carbon Co., Madison Ave., N. W., and West 117th St., Cleveland, Ohio, has awarded the contract for a 1- and 6-story, 55 x 91 and 55 x 96 ft. carbon plant to be erected here.

W. Va., Martinsburg—The Berkeley Woolen Co. plans to build a 4-story, 156 x 160 ft. addition to mill on Stephen St. Estimated cost, $100,000. The company will install $35,000 worth of spinning machinery. P. O. Keilholtz, Baltimore, Md., Arch.

W. Va., West Union—The Ideal Window Glass Co. plans to rebuild its plant which was recently destroyed by fire at a loss of $50,000.

MIDDLE WEST

Ill., Chicago—J. Johnson, 1528 Ohio St., has awarded the contract for the erection of a 1-story 22 x 76 ft. dairy. Estimated cost, $6,000.

Ill., Chicago—Morris Co., Union Stock Yards, West 43rd and Laflin Ave., plans to build a 1-story shop addition to its packing plant. Estimated cost, $75,000. D. Meredith, c/o owner, Arch.

Ill., Chicago—F. W. Williams, 2515 Taylor St., has acquired a 132 x 396 ft. site on Fairfield St. and 150 ft. on Taylor and plans to build a factory for the manufacture of picture frames. Estimated cost, $50,000.

Ill., East St. Louis—The D. M. Oberman Manufacturing Co., Jefferson City, Mo., has awarded the contract for a 2-story, 60 x 160 ft. factory for the manufacture of overalls, to be erected on 8th and Brady St., here. Estimated cost, $50,000.

Ind., Dunkirk—The Hart Glass Manufacturing Co. will rebuild its 1-story, 40 x 70 ft. and 1-story 60 x 200 ft. factories, which were recently destroyed by fire. T. F. Hart, Pres.

Ind., Easton—The Reid Murdock Co., Clark and River St., Chicago, Ill., is receiving bids for an addition to its canning factory here. A. Butterfield, local Mgr.

Ohio, Cincinnati—The Reliance Coal and Coke Co., 897 Union Trust Bldg., recently acquired the old Marmet Co.'s coal yards and plans to install a modern coal-handling equipment in same.

Ohio, Struthers—The Struther Furnace Co., has awarded the contract for the construction of a new river intake plant and plans to install the necessary machinery for the equipment of same. Estimated cost, $102,000.

Wis., Fondulac—The Wright Bros., North Main St., has awarded the contract for its 1-story, 50 x 92 ft. box factory to be erected on West Arndt St., near North Main. Estimated cost, between $14,000 and $15,000. Noted June 13.

WEST OF THE MISSISSIPPI

Iowa, Clinton—The Clinton Sugar Refining Co. is receiving bids for the erection of a 3-story, 65 x 65 ft. corn oil house.

Iowa, Clinton—The Lein Paper Co., 10th Ave. and 5th St., is having plans prepared for the erection of a paper mill and power plant. Estimated cost, $175,000. O. Klein, Mgr., J. Meirell, 410 Howes Blk., Arch.

Minn., Minneapolis—Fire recently damaged the factory of the Northwestern Furniture Manufacturing Co., 35 Power St., Nicollet Island.

Minn., Murdock—The Murdock Co-operative Creamery Co. will soon award the contract for the erection of a 1-story, 48 x 56 ft. creamery. C. G. Peterson, Secy., C. Kampfer & Son, 103 Bates Ave., St. Paul, Arch.

Minn., St. Paul—Brown & Bigelow, University and Hamline Ave., manufacturer of calendars and novelties, has awarded the contract for a 1-story, 88 x 225 ft. addition to its factory.

Mo., Kansas City—Fire recently damaged the plant of the C. R. Cook Paint and Glass Co., 2017 Bway. Loss, $40,000.

Mo., St. Louis—Fire recently damaged the factory of the T. L. Horn Trunk Co., 8th and Howard St. Loss, $25,000.

Tex., Houston—The Universal Tire and Rubber Co. has purchased 30 acres on the ship channel and plans to build a plant for the manufacture of automobile tires and tubes.

Tex., Mercedes—Wetegrove Co. plans to build a precooling and ice plant and will require considerable machinery for the equipment of same.

WESTERN STATES

Calif., Los Angeles—The W. E. McCaslin Co. has awarded the contract for a 2-story, 44 x 110 ft. packing plant to be erected on Lawrence and Sacramento St. Estimated cost, $6250.

Calif., San Francisco—The Fleischmann Co., 641 Mission St., manufacturers of yeast, has awarded the contract for the construction of a 2-story factory. Estimated cost, $20,000.

Calif., West Sacramento (Sacramento P. O.)—The National Rice Co. has started construction work on its plant. Estimated cost, $250,000. Noted June 27.

Calif., Woodlake—G. F. Stevenson, Laughlin Bldg., Los Angeles, has awarded the contract for a 97 x 113 ft. packing plant to be erected here.

Ore., Astoria—The Crown Williamette Paper Co. plans to build a pulp mill.

Ore., North Bend—L. J. Simpson plans to establish a sawmill with a daily capacity of 50,000 to 60,000 ft.

Wash., Roza—The Great Western Silicate Co. plans to build an addition to its mill and equip same with modern machinery. Estimated cost, $50,000.

CANADA

B. C., Duck Creek—J. J. Grady plans to build a sawmill.

Ont., Bobcaygeon—The Magnet Toy and Novelty Co., Port Hope, plans to build a factory on Sherwood St., here.

Ont., Galt—W. Scott, 36 Chapman St., is receiving bids for the construction of a 3-story addition to the factory of the Newlands Co., Ainslie St., S., manufacturer of glove and shoe linings. Noted June 6.

Ont., London—The Peerless Hosiery Co., Adelaide St., will receive bids about July 15 for the construction of an addition to its factory. A. E. Nutter, Dominion Bank Bldg., Arch.

Ont., Walkerville—H. Walker & Sons plan to build a plant for the manufacture of chemicals. Estimated cost, $1,000,000.

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